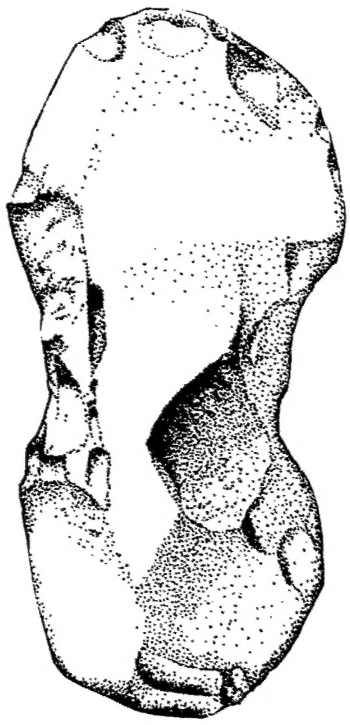
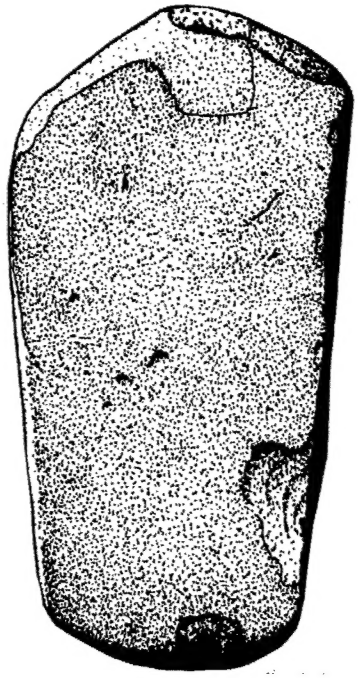
Archaeological Sites Inventory of the Training Area 7 Portion of the Piñon Canyon Maneuver Site, Las Animas County, Colorado

by
Mark Owens and Lawrence L. Loendorf

with contributions by
Christopher R. Loendorf
Lori S. Reed

Department of Sociology and Anthropology
New Mexico State University
Las Cruces, New Mexico





Project Administered through
National Park Service,
Midwest Archeological Center,
Lincoln, Nebraska
Cooperative Agreement Number
1443-CA-6000-98-016

Fort Carson
Cultural Resource Management Series
Contribution Number 5

Report prepared for and funded by
The Directorate of Environmental Compliance and Management,
Department of the Army, Fort Carson, Colorado

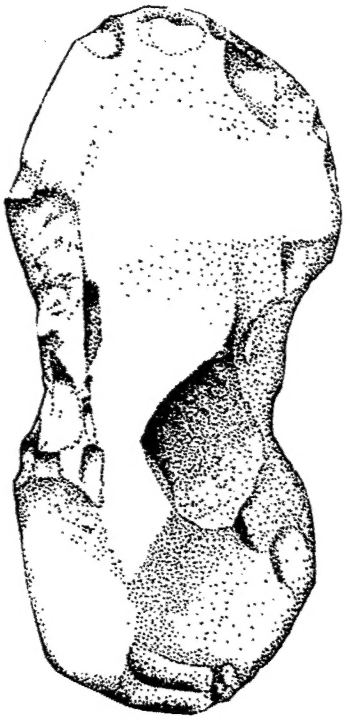
2002

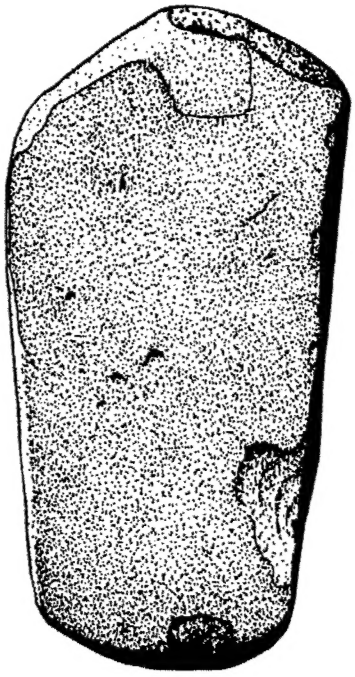
Archaeological Sites Inventory of the Training Area 7 Portion of the Pinon Canyon Maneuver Site, Las Animas County, Colorado

by
Mark Owens and Lawrence L. Loendorf

with contributions by
Christopher R. Loendorf
Lori S. Reed

Department of Sociology and Anthropology
New Mexico State University
Las Cruces, New Mexico





Project Administered through
National Park Service,
Midwest Archeological Center,
Lincoln, Nebraska
Cooperative Agreement Number
1443-CA-6000-98-016

Fort Carson
Cultural Resource Management Series
Contribution Number 5

Report prepared for and funded by
The Directorate of Environmental Compliance and Management,
Department of the Army, Fort Carson, Colorado

2002

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	2002	Final

4. TITLE AND SUBTITLE
Archaeological Sites Inventory of the Training Area 7 Portion of the Pinon Canyon Maneuver Site, Las Animas County, Colorado

5. FUNDING NUMBERS
1443-CA-6000-98-016

6. AUTHOR(S)
Mark Owens and Lawrence L. Loendorf

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
New Mexico State University
Box 30001
Las Cruces, New Mexico
88003

8. PERFORMING ORGANIZATION REPORT NUMBER
N/A

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Midwest Archeological Center
National Park Service
100 Centennial Mall N. Room 474
Lincoln, NE

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
N/A

11. SUPPLEMENTARY NOTES
Prepared for and funded by the Directorate of Environmental Compliance and Management, Fort Carson, Colorado.

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Available

12b. DISTRIBUTION CODE
N/A

13. ABSTRACT *(Maximum 200 words)*

For the past six years, archaeologists from New Mexico State University have been conducting cultural resource survey work on the Piñon Canyon Maneuver Site (PCMS) in southeastern Colorado. The research reported in this document took place in the Training Area 7 (TA 7) portion of the PCMS. TA 7 is one of the large land units utilized by the United States Army for training in the maneuvers of mechanized vehicles - mainly tanks. One hundred and sixty-seven prehistoric and historic sites were discovered during survey procedures in TA 7. Most were cultural material scatters or places where fragments of chipped-stone flaking debris, chipped-stone tools and ground-stone tools are exposed on the surface. Sometimes hearth features are evident, and occasionally there are remnants of stone habitation structures. The report on the TA 7 survey includes discussion about sites found in open steppe terrain that is located adjacent to ridges and hills. Both environmental settings were searched for sites. Archaeologists conclude that the hills were used for vantage and hunting, with some sites exhibiting intermittent use over the past 5,000 years. Both the steppes and the hills contain large numbers of grinding tools, suggesting an extensive and intensive use of plant remains.

14. SUBJECT TERMS	15. NUMBER OF PAGES
archaeology; prehistory, rockart; lithics; Las Animas County, Colorado	232
	16. PRICE CODE: N/A

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	Unlimited

Popular Abstract

For the past six years, archaeologists from New Mexico State University have been conducting cultural resource survey work on the Piñon Canyon Maneuver Site (PCMS) in southeastern Colorado. The research reported in this document took place in the Training Area 7 (TA 7) portion of the PCMS. TA 7 is one of the large land units utilized by the United States Army for training in the maneuvers of mechanized vehicles – mainly tanks. One hundred and sixty-seven prehistoric and historic sites were discovered during survey procedures in TA 7. Most were cultural material scatters or places where fragments of chipped-stone flaking debris, chipped-stone tools and ground-stone tools are exposed on the surface. Sometimes hearth features are evident, and occasionally there are remnants of stone habitation structures. The report on the TA 7 survey includes discussion about sites found in open steppe terrain that is located adjacent to ridges and hills. Both environmental settings were searched for sites. Archaeologists conclude that the hills were used for vantage and hunting, with some sites exhibiting intermittent use over the past 5,000 years. Both the steppes and the hills contain large numbers of grinding tools, suggesting an extensive and intensive use of plant remains.

Professional Abstract

Archaeologists identified 167 prehistoric and historic sites in Training Area 7 of the Piñon Canyon Maneuver Site. Lithic scatters make up the overwhelming majority (98%) of the sites. Local materials – hornfels/basalt, argillite, and quartzite – dominate chipped-stone raw material types. The non-local materials – Alibates dolomite from Texas, Black Forest silicified wood from central Colorado, and Jemez Mountain obsidian from New Mexico sources – suggest a north-south trade route or trail system was used by the prehistoric residents. The numbers of ground-stone tools suggest a heavy reliance on seed grinding and other plant processing for what likely constituted at least half -- if not more -- of the diet throughout the prehistoric period. A study on the distribution of the problematic tool type known as edge-ground cobbles or edge-ground manos was initiated in the survey. These tools are identified in the literature as having functioned as hide-working stones, knapping tools for chipped-stone tool manufacture and tools used for grinding seeds. Our preliminary results suggest the tools are invariably associated with other manos and tools used for plant processing and are even found in mano caches. This suggests that the tools served a grinding function – perhaps they were used for grinding small hard kernel seeds or in the final stages of grinding seeds for flour.

ACKNOWLEDGEMENTS

We are grateful to the many individuals and organizations that helped make the Training Area 7 project a successful one. The commitment of the Directorate of Environmental Compliance and Management, United States Army, Fort Carson to environmental and cultural resource management provides the foundation for this report. Specifically we appreciate Steve Chomko, Randy Korgel, and Tom Warren for providing support throughout the project. The National Park Service helped us in a variety of ways. National Park Service staff members Melissa Connor, Steven De Vore, Ralph Hartley, and Linda Zumpfe handled many of the administrative and technical requirements. Ron Marvin and Karen Roberts helped out with site recording. We would also like to thank Carrol Moxham for her guidance and assistance in the printing and production of this report.

No project can be successfully completed without the great personnel who helped us collect, process, and record all field data including survey field crew members Kelli Barnes, Jane Ann Blakney, Rich Burleson, Jeff Campbell, Mike Flowers, Lori Lincoln-Babb, Caralee Maechtle, Megan Snedden, Alicia Ventresca, Kay Winchester, and Jason Yeager. We thank all for a job well done and for their enthusiasm despite the sometimes rough field conditions. All laboratory work, including the completion of the site forms, was performed by Victoria Quiroz-Bacerra, Bonnie Newman, and Vincent Schiavitti. Christopher Loendorf completed an excellent projectile point analysis, and Lori Reed analyzed valuable ceramic data essential for the interpretation of the project sites. Pam Rasfeld and Seija Karki of New Mexico State University produced the illustrations on the cover. Victoria Quiroz-Bacerra provided the artifact illustrations in this report. Renee Beltran and Elaine Nimmo, project records technicians at New Mexico State University, contributed to the project in too many ways to mention. Thanks are due to Robin Beaver for her editorial precision. And a last, but not least, thanks is due to Sherri Landis who prepared wonderful meals for the field crews and support staff during the Training Area 7 project.

Though no piece of research is done without assistance and encouragement from others, no one but the authors are responsible for any shortcomings contained in this report.

FOREWORD

The archeological investigations reported in this manuscript are an important part of the Fort Carson Cultural Resources Management Program. The goal of the program is to maintain the largest possible area for military training while protecting significant cultural and environmental resources. Through an Interagency Service Agreement, the National Park Service, Midwest Archeological Center (MWAC), assists Fort Carson in accomplishing its cultural resources goals and meeting its legal obligations. New Mexico State University completed the reported project under a cooperative agreement with the MWAC.

The current study is part of an integrated plan that takes a long-term systematic approach to meeting identification, evaluation, and resource protection requirements mandated by the National Historic Preservation Act. The project reported here completes the first phase of the inventory program – completion of those areas where archeological resources were most likely to be present and in which training impacts could be expected. In addition, the results of this project are a valuable contribution to our knowledge of the prehistory, history, and resources of Las Animas County, Colorado.

Fort Carson began cultural resource studies on the Piñon Canyon Maneuver Site in 1983, immediately following the purchase of these lands. The program takes a multidisciplinary approach, combining archeological theory and historical methods with geological, geomorphological, botanical, and statistical techniques and procedures in order to focus its efforts to locate, evaluate, and protect significant cultural resources. Professional studies and consultations with Native American tribes have resulted in the identification of National Register of Historic Places eligible sites and districts. The cultural resources of Fort Carson and the Piñon Canyon Maneuver Site represent all major prehistoric and historic cultural periods recognized in the Great Plains and Rocky Mountains. Sites of the Paleoindian, Archaic, and Ceramic stages are present as are sites from the Fur Trade era, 19th century Hispanic and Euroamerican settlements, early 20th century homesteading and ranching, and World War II and Cold War era military sites.

The Cultural Resources Management Program is in the Directorate of Environmental Compliance and Management (DECAM). The directorate is tasked with maintaining Fort Carson's compliance with federal, state, and local environmental laws and mandates. The DECAM holistic management philosophy holds that all resources are interrelated. Decisions affecting one resource will impact other resources. The decisions we make today will affect the condition of Department of Army lands and resources for future training, research, and recreation. Mission requirements, training resources, wildlife, range, soil, hydrology, air, and recreation influence cultural resources management decisions. Integrating compliance and resource protection concerns into a comprehensive planning process reduces the time and effort expended on the compliance process, minimizes conflicts between resource protection and use, allows flexibility in project design, minimizes costs, and maximizes resource protection.

Federal laws protect the resources on the Piñon Canyon Maneuver Site and Fort Carson. Theft and vandalism are federal crimes. Protective measures ensure that Army activity does not inadvertently impact significant cultural and paleontological sites. Fort Carson does not give out site location information nor are sites developed for public visitation. Similar resources are located in the Picketwire Canyonlands where public visits can be arranged through the U.S. Forest Service, Comanche National Grasslands in La Junta, Colorado.

Fort Carson endeavors to make results of the resource investigations available to the public and scientific communities. Technical reports on cultural resources are on file at the Fort Carson Curation Facility (Building 2420) and the Colorado State Historic Preservation Office. They are also available through the National Technical Information Service, Springfield VA. Selected reports have been distributed to public libraries in Colorado. Three video programs produced by Fort Carson are periodically shown on Public Broadcasting Stations. Non-technical reports on the prehistory, history, and rock art of southeastern Colorado have been distributed to schools and libraries within the state.

Fort Carson continues to demonstrate that military training and resource protection are mutually compatible goals.

Thomas L. Warren
Director
Directorate of Environmental Compliance and Management
Fort Carson, Colorado
August 2001

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES
(continued)

Chapter I: Introduction

This report describes the results of archaeological investigations conducted in Training Area 7 at the Piñon Canyon Maneuver Site (PCMS), Las Animas County, Colorado. These investigations were conducted during the first half of the field season in 1998 (April to July) and the first fieldwork session of 1999 (May). New Mexico State University (NMSU) completed the project through a cooperative agreement (No. 1443-CA-6000-98-016) with the National Park Service (NPS) Midwest Archeological Center. The Directorate of Environmental Compliance And Management (DECAM), Fort Carson, Colorado, funded the project.

The sites described and interpreted in this report are located in the Priority I areas of Training Area 7. For the most part, these sites are located along, and in, the upper drainage basins of Van Bremer Arroyo, Burke Arroyo, Taylor Arroyo, and Big Water Arroyo. Training Area 7 itself is bounded on the north by the Big Arroyo Hills, on the south by the hogback and the PCMS property boundary, on the east by Rock Crossing and Military Service Road 3 (MSR), and on the west by the PCMS property boundary. The total acreage contained in Training Area 7 is 63,571 acres. The Priority I portion has been divided into 151 study units for a total of 9,857 acres (Figure 2.2). Study unit designations for past, current, and future archaeological work were developed from a high probability model designed by Ken Kvamme of the University of Arkansas. The reader should consult Kvamme (1984, 1988, 1990, 1992) for detailed descriptions of the mechanisms behind the model, its predictive capacity, and function as a useful tool for ongoing research on the PCMS.

The objectives for the investigations were to: (1) identify paleontological, prehistoric, or historic archaeological sites located within the project area, (2) determine the National Register of Historic Places (NRHP) eligibility for these sites, and (3) provide recommendations for the protection of sites that could be impacted by mechanized military maneuvers.

The NRHP criteria for eligibility to the National Register are originally listed in the *Code of Federal Regulations, Title 36, Part 60.4*. These criteria, as well as details regarding their application, appear in *National Register Bulletin 15* (National Register 1991). To be eligible for the NRHP a place must also have integrity and must not meet any one of the criteria considerations (i.e., cemeteries, birthplaces, graves, reconstructed properties). The guidelines set forth in 36 CFR 60.4 define five categories of historic properties including buildings, structures, objects, sites, and districts. In Training Area 7, all cultural remains encountered during survey were classified as sites. In *National Register Bulletin 15,* a site is defined as "the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archaeological value regardless of the value of any existing structure."

Sites were determined significant or not based under any or all of the four NRHP criteria. For the most part, all eligible sites recorded in this project were deemed eligible under Criterion D ("...have yielded, or may be likely to yield, information important in prehistory or history").

In Andrefsky (1990), four "research domains" were established to aid in the evaluation of prehistoric sites. These domains include chronology, paleoenvironments, settlement-subsistence systems, and exchange and mobility. If data related to these research domains can be recovered, the site should be evaluated as significant for the NRHP.

Two hundred and nine sites (170 unrecorded and 39 previously recorded) are discussed in this report. Results from the fieldwork indicate that 12 sites should be nominated to the National Register, while a total of 197 sites are considered as not eligible for the National Register and require no further work. Justifications for these determinations are given in the section pertaining to the eligibility recommendation for each of the sites investigated, and they are all listed in Appendices G and J. The site descriptions are given for the eligible sites in Chapter IV and the non-eligible sites are described in Chapter V. Materials derived from this work including notes, forms, photographic prints and negatives, scaled drawings, and artifacts are currently curated at the New Mexico State University Museum (Kent Hall) in Las Cruces, New Mexico. Eventually this material will be housed with other archaeological remains at the Fort Carson, Colorado, Curation Facility.

Chapter II: PHYSICAL AND CULTURAL BACKGROUND

Physical Background of the PCMS

The PCMS covers an area of 235,604 acres and is located in the northern portion of Las Animas County in southeastern Colorado (Figure 2.1). It exhibits considerable landform diversity, and within this area four major topographic units are seen (Schuldenrein et al. 1985). These defined units are the steppes, the hogback, the canyons, and the hills, and portions of all are noted within Training Area 7. The grassland steppes are the largest topographic unit in the PCMS. In Training Area 7, the steppes are found in flat or sloping terrain between the hogback and the Big Arroyo Hills. Several arroyos and canyons down-cut the steppes including Van Bremer Arroyo, Burke Arroyo, and Taylor Arroyo. The Purgatoire River drainage is located near the southeast corner of the training area.

The hogback is a vertical dike composed of olivine basalt that extends 15 km in a northwest to southeast orientation. It is located along the southern boundary of the PCMS and Training Area 7 and has shales and limestones upturned at its margins. Along the stream terraces of Van Bremer Arroyo, and on the flanks and top of the hogback, eroded basalt blocks show historic and prehistoric rock art.

The plains, low hills, and canyons of the PCMS range in elevation from between 1,341 to 1,768 m (4,400 to 5,800 ft) above sea level (asl). In Training Area 7, the elevation peaks in the Big Arroyo Hills (5,800 ft), and the gently sloping terrain trends to the southeast, terminating at an elevation of 4,700 ft at the confluence of the Purgatoire River and Van Bremer Arroyo. In general, the terrain is marked by steep to gently sloping hillsides formed by the Big Arroyo Hills and the numerous arroyo valleys. The PCMS is located along the western edge of the Great Plains physiographic province.

Geology

Sedimentary rocks dominate the PCMS, ranging in age from Triassic through Quaternary. The oldest rocks exposed come from the Dockum Group and are composed of fine-grained, horizontally bedded red sandstone (Evanoff 1998). Exposed rocks of the Jurrassic period include the Entrada Sandstone, Bell Ranch Formation, and the Morrison Formation. The Morrison Formation has three distinctive members, of which the lower member is a gypsum sequence, the middle portion is a limestone and claystone sequence, and the upper member is a mudstone and sandstone sequence. Overlying the Morrison Formation are rocks of the Cretaceous period. The rocks of the Dakota Group were deposited first and are composed of the Lytle Formation, Glencairn Formation, Mesa Rica Sandstone, Pajarito Sandstone, and a sequence of unnamed transitional units. The remaining Cretaceous deposits are the Graneros Shale, Greenhorn Formation, Carlile Shale, and the Niobrara Formation.

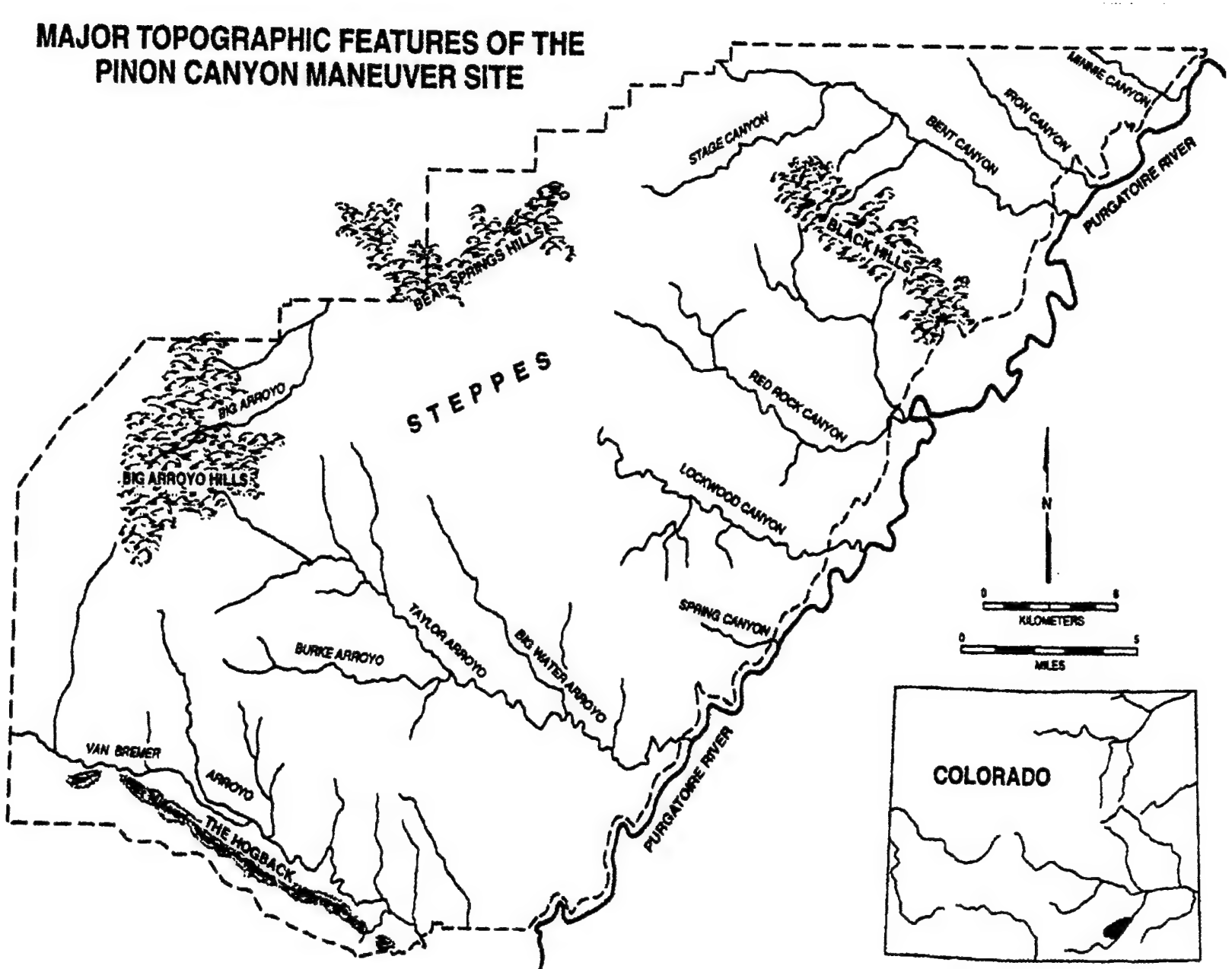


Figure 2.1: Major Topographic Features of the Pinon Canyon Maneuver Site

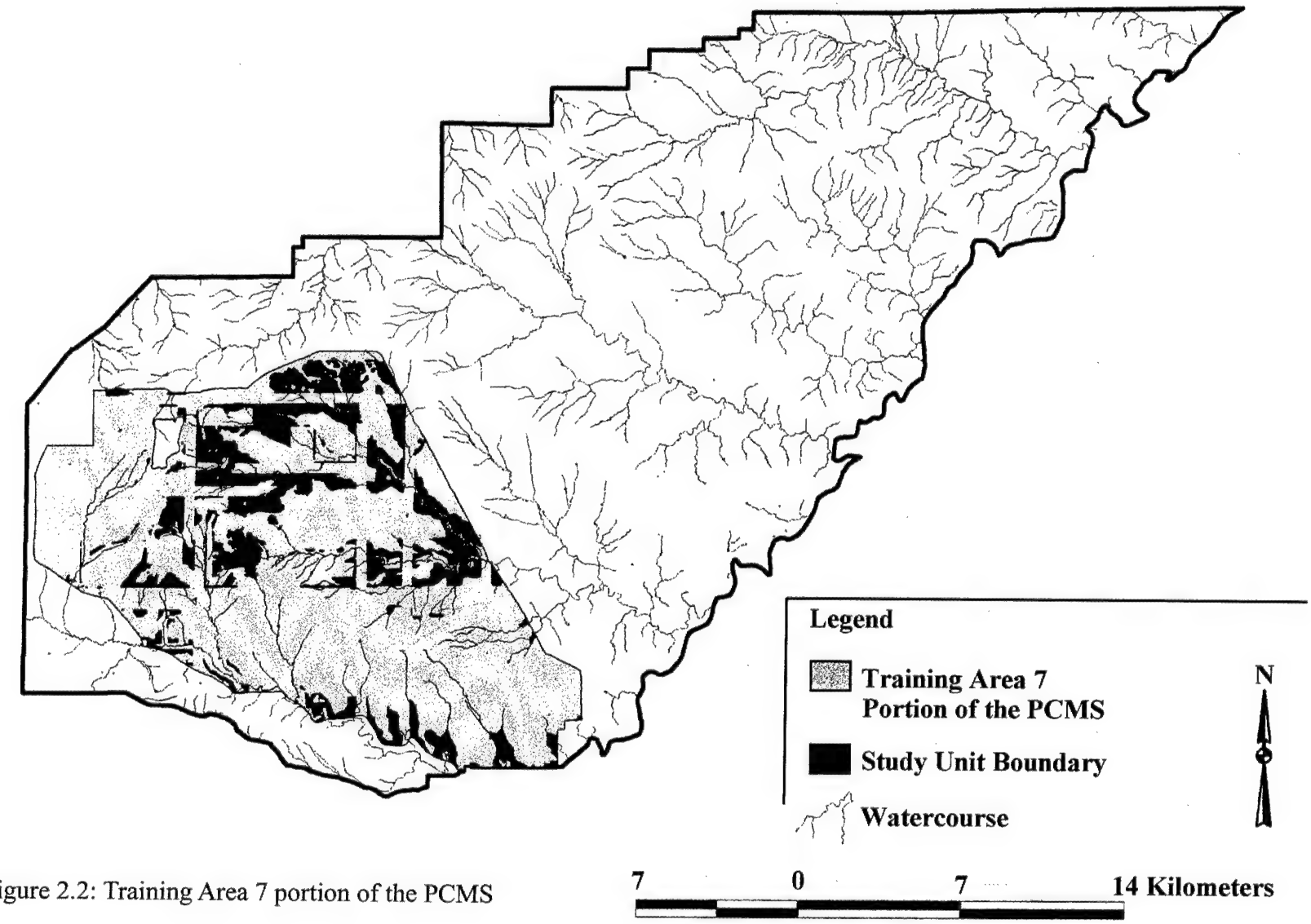


Figure 2.2: Training Area 7 portion of the PCMS

During the Tertiary period, basalt intruded into the earth's crust in the form of a dike. After the area was subject to erosion, the hogback was exposed at the surface. The most recent deposits in the PCMS are alluvial, pediment sediment, and colluvial deposits of Holocene age, and are located throughout the area as surficial clayey silt, earthflow deposits, or terrace gravels. For the most part, these Holocene deposits form the surface soils of Training Area 7.

Permanently available water is limited in most parts of Training Area 7. The best water sources are the Purgatoire River, and springs or catchments in Burke Arroyo, Van Bremer Arroyo, and Taylor Arroyo. The numerous side drainages feeding these waterways contain many intermittent water sources.

Climate

The temperature and amount of precipitation registered for the PCMS and Las Animas County are related to five factors. These are: distance from the equator (latitude), continental position, elevation, topography, and winter storm track pattern (Siemer 1977). The position and leeward location of the PCMS relative to the southern Rocky Mountains directly influences the present climate. As eastward traveling masses of air pass over the mountains and higher land, the air rises and cools. Because cooler air holds less water than warm air, precipitation falls into the mountains. The PCMS is relatively far away from the mountains and thus less precipitation falls in this area. Moisture from the Gulf of Mexico and the Pacific Ocean must travel long distances before arriving in Colorado and therefore most is lost in mountain ranges. Also, the jet streams often carry potential sources of moisture to the north or south of Colorado.

It is difficult to generalize the climate of the PCMS and Las Animas County because of local topographic changes. In Las Animas County, the wettest months are May through August, and November through February are the driest months (Trinidad AP Weather Station 1948-1996). The average yearly precipitation in Colorado is 17 inches and the annual precipitation for Las Animas County is 12.9 inches. Temperatures are affected by warm or cold fronts passing through the region, and they can also be affected by radiational surface warming. The maximum daily temperatures generally occur during the afternoon as the suns rays warm the land. The average yearly temperature in Las Animas County is 51.7 degrees, ranging from a yearly low in January (31.4° F) to highs of 73.5° F in July. The total yearly snowfall averages 40.2 inches, and most usually occurs in March (7.1 inches), November (6.3 inches), and December (6.4 inches).

At the Timpas 13SW weather station (1978 – 1993), the average yearly precipitation recorded is 14.9 inches. The wettest months are May (2.09 inches) and August (2.06 inches), and the driest months are December (.60 inches) and January (.57 inches). The average yearly temperature in Timpas is 52.7° F, with a low of 29.5° F in December and a high of 74.3° F in August. The mean maximum temperature ranges from 92.1° F in July to 42.3° F in December. The average number of days with temperatures below 0 degrees Fahrenheit is eight, and the number of days with a minimum temperature of less than 32 degrees Fahrenheit is 152.6. The temperature exceeds 90 degrees Fahrenheit 60 days of the year. The total yearly snowfall averages 53 inches, with the most accumulating in the month of March (11.6 inches). In the PCMS, an average annual growing season (142 days) begins in May and ends in early October.

Paleoclimate

During the Pleistocene, the global climate entered a distinctly colder phase punctuated by periods of glacial advance and retreat from the polar and mountainous regions (including the Rocky Mountains). The global temperature was about 6° C cooler during periods of maximum glacial advance and cooling was more pronounced at the poles than at the equator (Barry and Chorley 1987; Crowley and North 1968). The Wisconsin glacial retreat 11,000 – 10,000 BP signaled a general warming and drying trend.

A basic outline for regional climate change can be found in Zier and Kalasz (1999) and Antevs' (1955) general model for Holocene climatic changes. Antevs (1955) refers to a series of warming and cooling events which began roughly 13,000 years before present and end with the "Little Ice Age" (AD 1550-1700).

Data recovered from the PCMS indicate that for the past 2,500 years (since the Late Archaic Period) environmental fluctuations have not been particularly severe. Scott-Cummings (in Schiavitti et al. 1999) identifies warm and wet conditions in the PCMS with fluctuations between approximately 500 BC and AD 970. Pollen evidence shows the period between 450 BC and 520 BC exhibited somewhat wetter conditions than just after 520 BC. Periods characterized by less effective moisture began at approximately AD 970, and by AD 1200 conditions ameliorated with a return to more mesic conditions. Schuldenrein et al. (1985) identify a drier and wetter period between 350 BC and AD 1000 with a warm and dry climate after AD 1000; and Loendorf et al. (1996: 279-280) present a wetter climate trend between 2500 and 1000 BP. Chomko (1997) hypothesizes that the environment of the Ceramic Stage (Diversification Period) remained stable.

Flora and Fauna

The vegetation within Training Area 7, and the PCMS in general, is strongly affected by soils, climate, aspect, grazing (prior to 1983), and military use. Twenty-six plant communities are found in the PCMS and these are further described in Shaw et al. (1989). Of the plant communities, 16 are classified as shrubland, six are woodland, and four are grassland. Eighteen of the 26 plant communities are found in one form or another in Training Area 7 and consist of all four grassland communities, twelve of the shrubland communities, and two woodland communities (Table 2.1). A list containing the plant species (common and scientific name) and environmental community for plants in Training Area 7 is found in Appendix F.

In examining past human occupation of the PCMS, it is not the dominant or most common plants that should be examined, but rather the plant species that were directly useful to people. Directly edible or preservable plants included onions, sedges, prickly pear, groundcherries, American plums, currant, chokecherries, Indian rice grass, and sunflowers, among others.

Table 2.1. Plant Communities Contained in the Training Area 7 Project Area.

	Environmental Community		
Plant Community	**Woodland**	**Shrubland**	**Grassland**
Western Wheatgrass/Blue Grama			X
Bigelow Sagebrush/Blue Grama		X	
Bigelow Sagebrush/Winterfat		X	
Sand Sagebrush/Small Soapweed		X	
Fourwing Saltbush/Alkali Sacaton		X	
Black Grama/Hairy Grama			X
Blue Grama/Galleta			X
Greasewood/James Frankenia		X	
One-seeded Juniper/Black Grama	X		
One-seeded Juniper/Littleseed Ricegrass	X		
Pale Wolfberry/Blue Grama		X	
Common Hoptree/New Mexico Needlegrass		X	
Skunkbrush Sumac/Wax Currant		X	
Sandbar Willow/Canada Wildrye		X	
Black Greasewood/Alkali Sacaton		X	
Alkali Sacaton/Galleta			X
Small Soapweed/Red Threeawn		X	
Small Soapweed/Little Bluestem		X	

Table 2.2. Classificatory Scheme for the Arkansas River Basin (from Zier and Kalasz 1999).

Stage/Period/Phase	Dates
Paleoindian	**>11,500-7800 B.P.**
Pre-Clovis	>11,500 B.P.
Clovis	11,500-10,950 B.P.
Folsom	10,950-10,250 B.P.
Plano	10,250-7800 B.P.
Archaic	**7800 B.P.-1850 B.P. (A.D. 100)**
Early	7800-5000 B.P.
Middle	5000-3000 B.P.
Late	3000 B.P.-1850 B.P. (A.D. 100)
Late Prehistoric	**1850 B.P.-225 B.P. (A.D. 100-1725)**
Developmental	1850-900 B.P. (A.D. 100-1050)
Diversification	900-500 B.P. (A.D. 1050-1450)
Apishapa Phase	900-500 B.P. (A.D. 1050-1450)
Sopris Phase	900-750 B.P. (A.D. 1050-1200)
Protohistoric	500-225 B.P. (A.D. 1450-1725)

Medicinal plants common to the PCMS include sagebrush, juniper, coneflower, goldenrod, and globemallow. Woodland species were used for structures or dwellings, for heating and cooking, and for other purposes. Many other plants such as rabbitbrush, eriogonum, snakeweed, muhly, soapweed, and grama were used for basketry or tools (brushes and brooms). Indirectly, grasses and forbs were important because they provided forage for large and small herbivores. Other plants provide cover and shelter for wildlife.

The current fauna of the area is abundant and varied. Commonly observed animals on the PCMS include pronghorn, elk, mule deer, bighorn sheep, coyote, red-tailed hawk, cottontail and jack rabbit, prairie dog, bobcat, badger, and porcupine. Small mammals and nongame mammals found in the area are snowshoe hare, squirrel, muskrat, weasel, ringtail, shrew, mole, chipmunk, woodrat, mice, bats, voles, ground squirrel, pocket gopher, skunk, and fox (swift and red). Both mountain lion and black bear have been seen in the area, bears probably on seasonal migration. Reptiles constitute a major portion of the grassland environment with species such as the western bullsnake, prairie rattlesnake, racers, garter snakes, western hognose snake, corn snake, short-horned lizard, and painted turtle. Bird types include bald and golden eagles, turkeys, owls, sparrows, western meadowlark, jays, woodpeckers, quail, and a number of others. A more extensive discussion regarding fauna can be found in Fitzgerald et al. (1994). Several prehistorically significant species, such as bison, grizzly bear, and gray wolf, were removed from the area in historic times.

Cultural Overview of the PCMS

This section provides a brief overview of the prehistory in southeastern Colorado. This information is derived from work by Zier and Kalasz (1999), Gunnerson (1987), Lintz and Anderson (1989), Carrillo (1990), Hanson and Chirinos (1989), Butler (1988) and others who have provided reconstructions of the prehistoric sequence. The proposed cultural taxonomy for the Arkansas River Basin (Zier and Kalasz 1999) will be the framework used for this report. In general, the prehistory of the Arkansas River Basin is divided into three stages and ten periods and two phases (Table 2.2).

The Paleoindian Stage is the earliest occupation in eastern Colorado that is accepted by most North American archaeologists. One of the most interesting debates in American archaeology deals with whether human occupation of the New World predates ca. 11,500 BP. Accepted occupations predating 11,500 BP are referred to as pre-projectile occupations. To date, there are few accepted sites in North America that predate 11,500 BP, though the Dutton, Selby, and Lamb Springs sites in eastern Colorado are thought to have potential pre-Clovis occupation. No remains from this stage have been recovered from southeastern Colorado or the PCMS.

Paleoindians were nomadic hunters and gatherers who arrived in the New World approximately 11,500 BP. Most archaeologists believe that they entered the New World by walking across a land bridge connecting modern day Siberia with Alaska that was temporarily exposed by the lowering of the sea level at the end of the Wisconsin glaciation. Ice-free corridors opened up as the glaciers retreated, allowing Paleoindian populations to migrate further to the south. Zier and Kalasz (1999) recognize four periods of the Paleoindian Stage in southern

Colorado: Pre-Clovis (>11,500 BP), Clovis (11,500-10,950 BP), Folsom (10,950-10,250 BP), and Plano (10,250-7800 BP). Remnants of the Paleoindian Stage are rare in the PCMS, and these are commonly found as isolated tool fragments. There are several known site locations found in areas surrounding the PCMS including Olsen-Chubbuck, Hahn, and the type site for the Folsom period, which is located about 100 km to the south in New Mexico. Survey areas containing isolated Paleoindian projectile points recovered from surface contexts include Red Top Ranch, the Fort Carson Military Reservation, the Flank Field Storage Area, the Mid-Huerfano Project Area, and the Cyprus Mines Hanson Project Area.

In general, Paleoindian remains are often associated with Pleistocene megafauna such as mammoth and an extinct ancestor of the bison. This association led many archaeologists to suggest that Paleoindian subsistence was almost exclusively based on big game animals. However, recent studies have documented the exploitation of small game animals such as rodents, turtles, fish, birds, prairie dogs, cotton and jackrabbits, and marmots, as well. During the Plano period the occurrence of ground-stone tools indicates an increase in vegetal food processing. This evidence suggests that Paleoindians probably had a broader subsistence base than was once recognized.

Archaeological sites in southeastern Colorado start to become more common and better understood during the Archaic Stage. The Archaic Stage is divided into three periods: Early (7800-5000 BP), Middle (5000-3000 BP), and Late (3000-1850 BP). Archaic sites yield grinding stones, large stemmed and notched projectile points, other bifacially and unifacially made chipped-stone tools, flake tools, and worked bone and shell. Unnotched and unstemmed projectile points also occur. Archaic site types include open campsites, rockshelters, subterranean structures, lithic and ground stone scatters, and quarry sites. There are special-function sites, such as game drive sites or stone ring sites, but these have been found outside of the PCMS. Features associated with Archaic sites include hearths and hearth remnants (piles of heat-altered stone), rock art panels, pit features, and burned-rock middens.

In general, the Archaic Stages of North America are characterized by an increase in regional variation. However, the basic pattern of Archaic life consisted of people living in relatively small groups relying on hunting and foraging for subsistence. Since much of the Pleistocene fauna relied upon by Paleoindians became extinct, Archaic hunters and gatherers had to shift the main focus of their subsistence. High frequencies of grinding stones suggest that plants started to become more important in the diets of Archaic people. The oldest rock art dated thus far in the PCMS is found at Archaic sites, and the earliest forms are usually composed of abstract designs, but animal forms are also known.

Most of the sites discussed in this report date to the Late Prehistoric Stage, which is divided into three periods: Developmental (1850 to 900 BP), Diversification (900 to 500 BP), and Protohistoric (500 to 225 BP). Other terms, such as Apishapa Phase and Sopris Phase are employed to divide the Diversification Period.

Important changes of the Late Prehistoric Stage include the utilization of both domesticated plants and ceramics, and there is evidence to suggest that the bow and arrow was adopted. Mobility decreased and sedentism increased from the Developmental Period to the

Diversification Period, as attested to by the presence of stone slab structures. In the PCMS, these structures tend to be small (approximately 2-3 m in diameter), circular structures with upright slabs. More formal structures and elements such as enclosing walls and dividing walls also appear in rockshelters at this time.

New information about the Late Prehistoric Stage has been developed through excavations at sites in Welsh Canyon. Schiavitti et al. (1999:257-258) concludes, based on pollen evidence, that Welsh Canyon experienced wet and dry cycles during the Ceramic Stage (Diversification Stage). Even though these climatic conditions were not severe, some were associated with what appears to be a population increase throughout Welsh Canyon. Adaptive response to these changes seems to have taken the form of diversification of subsistence practices, and an increase in trade and exchange with groups or individuals outside of southeastern Colorado.

Euroamerican contacts and the introduction of the horse at around 300 BP characterize the Protohistoric Period. Between 1500 and 300 BP, the area of the PCMS may have been in control of the Plains Apache. The Comanche were also in the area between 300 and 250 BP. After 250 BP, the Kiowa were linked with the Comanche and often made expeditions into the PCMS area. Late arrivals into the area include the Ute, Cheyenne, and Arapaho (Hanson and Chirinos 1989:18-38).

Euroamerican settlements to the south of the area made for significant changes after 400 BP. The active trade between the Plains Apache and the Pueblo Indians in this period was an important part of this change. The Pueblo traders exchanged corn, pottery, and blankets for Apache deerskins and buffalo hides, meat, and tallow (Carrillo 1990:XVIII-7). The Spaniards, New Mexicans, and Comanche entered into this trading pattern in what is referred to as the *Comanchero* period.

Ultimately, the New Mexicans and Spaniards started their own buffalo hunting for trade; these groups, known as the *ciboleros*, were not well liked by the Comanche, who complained about them until the buffalo were exterminated. By 1821, when Mexico obtained its independence from Spain, sheep raising had become an important industry in the region. It became an even more popular means of livelihood by the end of the Mexican-American War (1848).

By 1859 there was a permanent sheep ranching operation on the upper Purgatoire River that was operated by two Hispanic brothers, Gabriel and Juan Gutierrez (Carrillo 1990:XVIII-27; Friedman 1985:63-64). The discovery of gold in the mountains near Denver stimulated economic growth and the demand for supplies. Travel routes brought more settlers to the region, and by the late 1860's, Charles Goodknight established a route to drive cattle from Texas through the west end of the PCMS. Permanent settlement by Euroamericans quickly followed (Friedman 1985; Haury 1989).

Chapter III: FIELD AND LABORATORY METHODS

The Training Area 7 survey project was completed during the first half of the field season in 1998 (April to July) and the first session of the 1999 (May) field season. The principal investigator for both survey projects was Lawrence L. Loendorf. During the 1998 season Vincent Schiavitti directed both field and laboratory operation. The field personnel for the 1998 season were crew chiefs Christopher Loendorf and Mark Owens, and crew members Rich Burleson, Mike Flowers, Jane Ann Blakney, Megan Snedden, Lori Lincoln-Babb, Alicia Ventresca, Jeff Campbell, and Jason Yaeger. Bonnie Newman performed lab operations and database management. Midwest Archeological Center personnel included Karen Roberts and Ron Marvin, who assisted the project at various times.

During the 1999 field season Mark Owens was in charge of field operations, and Bonnie Newman directed all lab operations. The crew chiefs for the 1999 season were Mark Owens and Mike Flowers. The field crew members were Rich Burleson, Kay Winchester, Caralee Maechtle, Kelli Barnes, and Jane Ann Blakney. The Midwest Archeological Center representative was Ron Marvin.

The field and analytical methods used to conduct this project followed the procedures established by Dean (1992). The intent of the survey was to locate and record all historic and prehistoric cultural remains found in the Priority I portion of Training Area 7 and to collect data in a manner that supplements previous and future archaeological investigations in the PCMS. The Priority I areas were further divided into study units, and these were examined using uniform 20 m parallel transects.

After arriving in the project area, corner boundaries were located for the study unit to be surveyed. From the corner, parallel transects of 20 m were performed on cardinal compass bearings. In difficult terrain or in areas where the topographic features may have hidden small sites it was sometimes necessary to leave the transect path. Usually after a short time the transect was resumed.

Once cultural materials were identified, a pin flag was placed at the initial find. The survey crew then examined the surrounding area for additional artifacts, structures, or features. When artifacts were noted, a single flag was placed in the ground. Double pin flags were placed at structures, features, diagnostic artifacts, and formal chipped- or ground-stone tools. If the location contained fewer than four artifacts or a single diagnostic artifact, it was recorded as an isolated find (IF). If a diagnostic artifact with one or more additional artifacts was noted, the location was recorded as a site. If features or structures were found, the location was then recorded as a site regardless of the artifact density. Additional criteria used for determining prehistoric and historic sites, as well as isolated finds, are found in Dean (1992:IV-11-12). Once the size of the site boundary was established (20 m break in artifacts), the recording procedures began.

Data recovery on each site began with the establishment of a site datum to serve as a reference for all measurements. Sections of ½-inch steel re-bar 45 cm long were used for this

project, and for the most part, these were placed at the center of the site or directly in front of rockshelters. Stamped site identification tags (military "dog" tags) were then wired to the base of the datum and covered with tabular rocks stacked in cairn-like fashion.

Location information was collected using a Trimble™ Pathfinder Global Positioning System (GPS) and a military "Plugger" GPS. A minimum of 180 point readings were collected for each datum using the Trimble™ GPS, and a file containing these readings was designated using the site number. Because the signal recorded by this GPS is encrypted, data collected by this unit is only initially accurate to approximately ±100 m. The site number file was later differentially corrected, then grouped, in the laboratory using Pathfinder Office™ software and base station files obtained from Compasscom, Inc.® (a base station and mapping data supplier) from the internet. The result produces a single exact Universal Transverse Mercator (UTM) position for the site datum. The "Plugger" is capable of field accuracy between 10 and 15 m and was used to plot site locations on U.S. Geological Survey (USGS) 7.5-minute topographic maps, quickly locate the corners and boundaries of study units, and determine field position in difficult terrain.

For each site a sketch map and feature planview maps were made, photographs were taken, the State of Colorado site forms were completed, and lithic and historical artifact analysis was performed. To facilitate the management and comparability of collected data, field specimen (FS) numbers and feature numbers were assigned when applicable. FS numbers were assigned to patterned or formal tools, unique lithic specimens, and diagnostic artifacts.

Every site and isolated find is plotted on a USGS 7.5-minute quadrangle map by a crew chief. Measurements for each site and feature map are made in the metric system. Elements incorporated into the maps include contour lines, site datum location and/or distance to datum from feature, site boundary, features (numerical designation), all tools (FS numbers), landmarks or natural features, roads and fences, previously surveyed or tested areas, all man-made disturbances, and a legend. The legend includes scale, contour interval, site number, north arrow, mapper's initials, and date as well as symbols used on the map.

For each isolated find, a State of Colorado Isolated Find form was completed. Location information was taken from the "plugger," and the location was plotted on the appropriate USGS quadrangle map. Artifacts were collected using the same criteria employed at sites.

Field Artifact Recording Procedures

Lithic materials constituted the bulk of the artifacts located in Training Area 7. All lithic materials are described within two major categories: chipped stone (debitage and patterned tools) and ground stone. Field analysis was performed on all artifacts using the coding formats found in Appendices A, B, and C. The guidelines and definitions for this analysis were based on the standards set forth in Owens et al. (2000:17-22) and can be found again in Chapter VI. The attribute data was then logged into portable field computers in Excel spreadsheet format. At the end of each field day, separate site files contained in the field computers were backed up and then downloaded into the master project database.

Historic artifacts were recorded on the State of Colorado Historic Component form and a Record of Cans not Collected form.

Collected artifacts were placed in specimen bags and labeled with project designation, site number, FS number, contents, date, and collector and crew chief initials. The collected artifacts include: patterned or formal lithic tools, edge-ground cobbles, unique or nonlocal lithic materials, prehistoric ceramics, diagnostic artifacts (historic and prehistoric), cartridge cases, and dated historical items.

Laboratory Procedures

A temporary field facility was set up at Red Rocks Ranch (April-July 1998 and May 1999) and was intended to support the field operations, organize the collected artifacts, and review all field records for omissions. At the end of each field season, laboratory operations were moved to the New Mexico State University Museum (Kent Hall).

Laboratory processing began with a cross inventory of forms, artifacts, photographs, maps, and databases. Errors or omissions were listed, and this list was reviewed by the appropriate field crew chief and corrections were made. Following initial inventory, artifacts were cleaned, catalogued, and labeled. Artifacts were then placed in a plastic specimen bag with site number, FS number, date, collector name, and project designation written on the outside. An acid free label containing the same information is placed in the bag, which is then ready for curation.

Further lithic analysis encompassed chipped stone tools and edge-ground cobbles. These were analyzed using the established criteria in Owens et al. (2000:241-245, 293-297) which resulted in the coding formats found in Appendices D and E. Analysis of the chipped stone tools included the following traits: artifact type, dimensions, broken, material type, cortex, drill rotation (on drills only), manufacturing stage, use wear, and utilized edge assessments. Edge-ground cobble analysis included observations on material type and grain characteristics, facet number, facet/bevel assessments, modification, and secondary mano usage.

Ceramic samples were sent to Animas Ceramic Consulting, Inc., for analysis, and they are discussed in Appendix I. The obsidian specimens were visually compared to known types in the PCMS comparative collection. The classifiable projectile points were sent to PDQ 1-Hour Photo in Las Cruces, New Mexico, to be photographed.

Chapter IV: ELIGIBLE SITES

Twelve sites encountered during the Training Area 7 survey were determined to meet at least one of the four criteria and were determined eligible for the National Register of Historic Places. In general, all eligible sites encountered in this project fell into Criterion D (have yielded, or may be likely to yield, information important in prehistory or history). In the following sections, sites are discussed with details addressing location, environmental setting, features, artifacts, temporal placement, research domain potential, and eligibility recommendation.

5LA8013

Site 5LA8013 is a large, fairly dispersed scatter of lithic materials (Figures 4.1 and 4.2) containing a single deflated hearth and a non-portable grinding surface. It is located on top of a large, east to west trending ridge which, in turn, overlooks an unnamed side drainage into the Purgatoire River (1,140 meters to the southeast). Numerous areas of sandstone outcrop on the site surface. Overall, the site terrain is flat with terraced slopes (3-6°) extending down into the drainage at the eastern edge of the site. With the steep gradient visible over most of the site surface, it is apparent that sheetwash erosion continues to erode the surface soils down into the drainage below. Another site, 5LA3545, is located in this drainage. The PCMS boundary fence bisects the site (north to south) at the western edge, with most of the artifact scatter outside the mechanized training area.

The plant community is characterized as shrubland with an overstory of juniper. Plant types noted at the surface include cholla, soapweed, prickly pear, broom snakeweed, skunkbrush sumac, and various grama grasses. The soils are residual in nature and are classified as sandy loam. Various depths were noted in erosional features, with a maximum depth of 40 cm observed.

Features

Two features were recorded at 5LA8013. Feature 1 is defined as a localized (1 x 1.2 m) scattering of fire-cracked rock, possibly representing a deflated hearth. Very little ash staining is present at its surface, and it is unknown how much of this feature remains buried. This feature can be found 98 m from the datum at a bearing of 230 degrees. Feature 2 is a non-portable milling surface located on a 3.7 x 1.5 m outcropping of sandstone.

Lithic Artifacts

The surface artifact assemblage consists of 117 pieces of debitage, six ground-stone artifacts, and five patterned chipped-stone tools. Table 4.1 presents a summary of the chipped-stone debitage recorded at the site. The debitage is 37% argillite, 24% hornfels/basalt, 17% coarse-grained quartzite, 10% fine-grained quartzite, 9% chert, 2% quartz, and 1% chalcedony. All of these materials can be found inside the PCMS in cobble or nodule form, or outcropping in beds at the surface. The debitage is 59% simple flakes, 29% complex flakes, and 12% shatter.

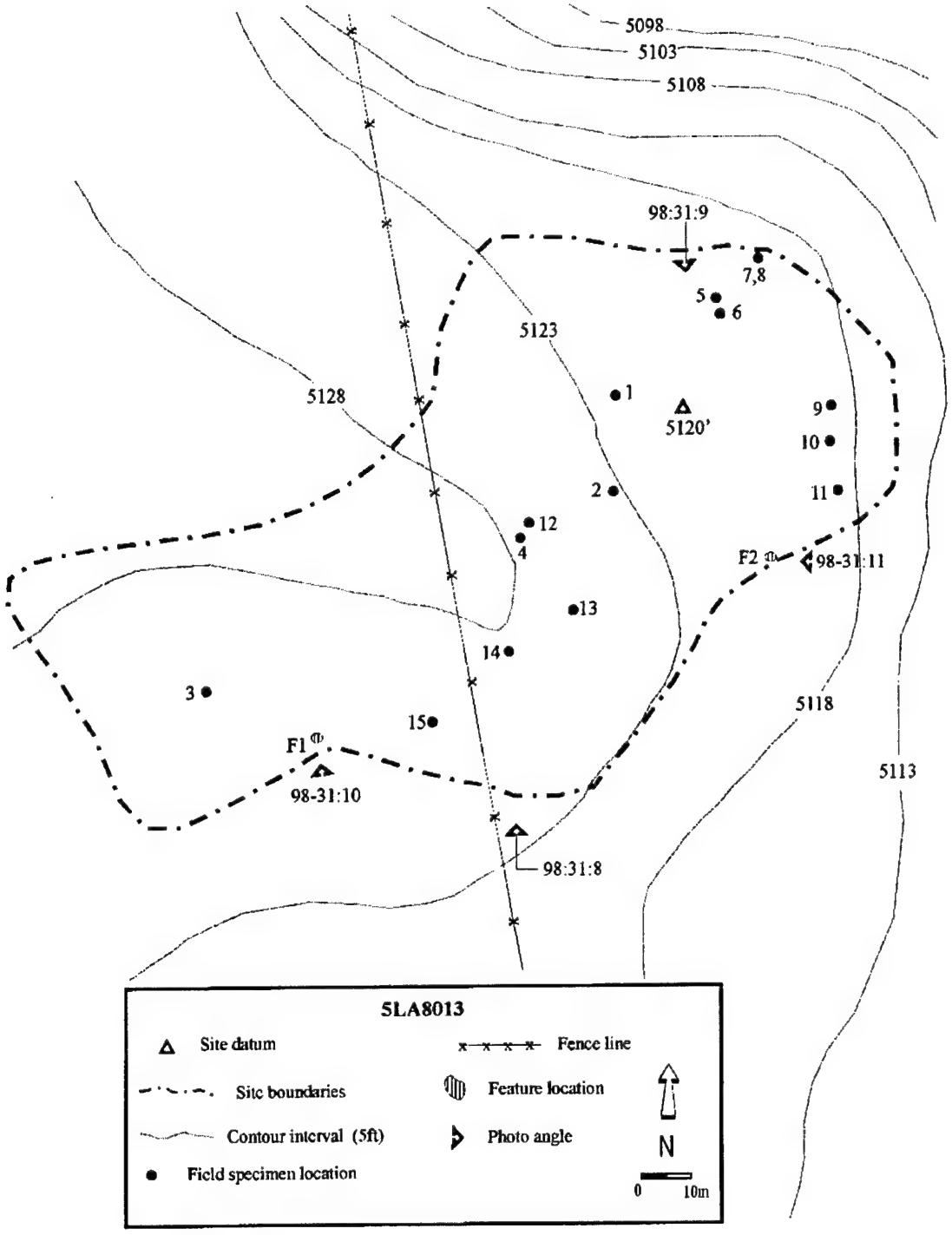


Figure 4.1: Site map, 5LA8013.

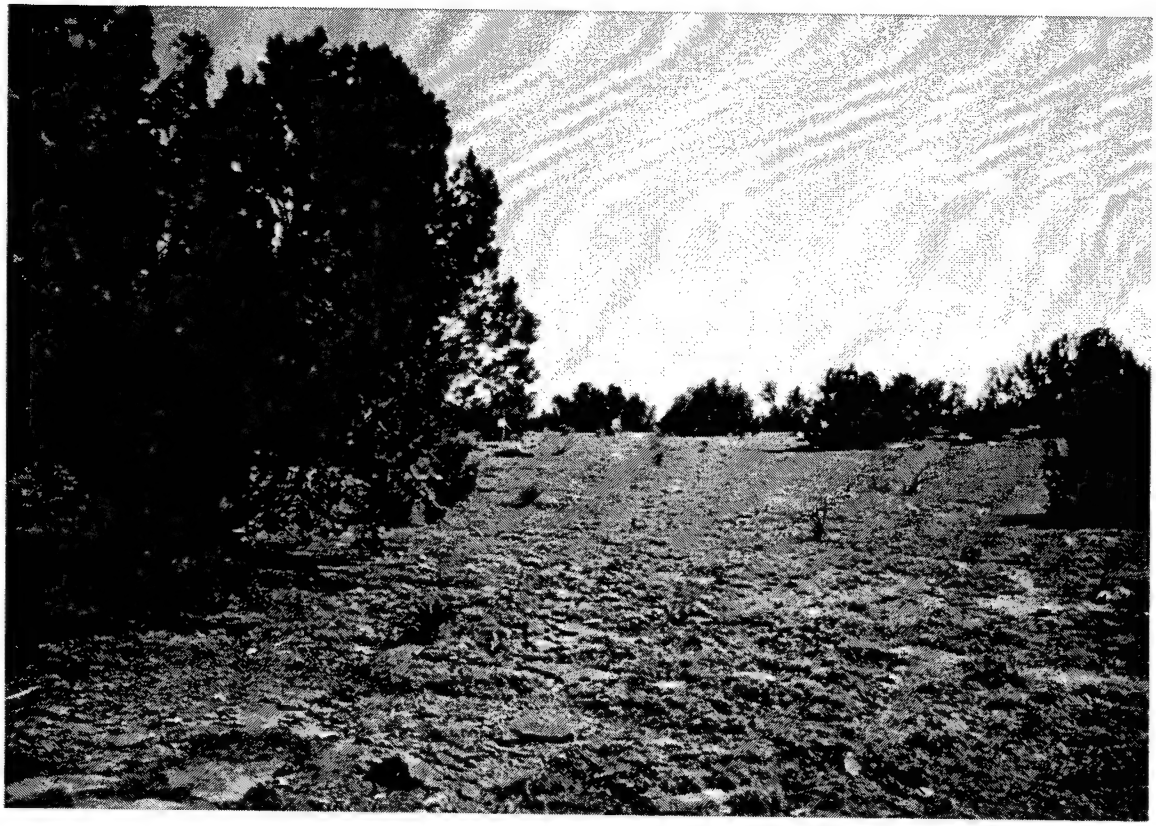


Figure 4.2: Photograph of site 5LA8013. Overview with datum in the foreground. Photograph taken facing south (180 degrees). Negative 98-31:9.

Table 4.1: Summary Description of Chipped-Stone Debitage for 5LA8013.

	Argillite	Chalcedony	Chert	Quartzite	Hornfels/Basalt	Quartz
Total	43	1	11	32	28	2
Large	23	0	5	17	17	2
Small	20	1	6	15	11	0
Cortical	22	0	3	10	13	1
Noncortical	21	1	8	22	15	1
Complex	12	1	6	9	6	0
Shatter	6	0	1	1	5	1
Simple	25	0	4	22	17	1

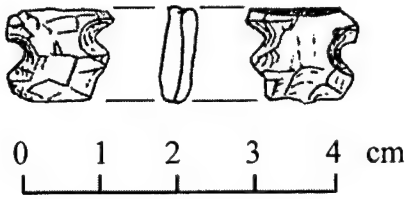


Figure 4.3: Projectile point recovered from site 5LA8013: 5LA8013.0.5 (FS13).

Fifty-five percent of the debitage items show some degree of dorsal cortex. Of these, 30% are large cortical items and 25% are small cortical items. Six pieces of argillite and four chert specimens show a red or black color change from thermal exposure.

Of the 69 simple flakes, most are argillite (25), hornfels/basalt (17), and coarse-grained quartzite (13). Those remaining are fine-grained quartzite (9), chert (4), and quartz (1). Thirty-four complex flakes were recorded-- argillite (12), quartzite (9), chert (6), hornfels/basalt (6), and chalcedony (1). The shatter specimens are made of argillite (6), hornfels/basalt (5), chert (1), quartz (1), and quartzite (1). The high number of cortical flakes, coupled with the lack of biface-thinning flakes indicates that early stage lithic reduction was employed to produce most of the debitage items. The presence of small noncortical flakes (33%) shows a fairly strong emphasis on early-stage biface manufacture with little final biface thinning or resharpening. In other words, most of the materials appear to have been quarried locally and were reduced to large bifaces on the site. Either the smaller biface-thinning flakes have been transported from the surface by erosion, or this activity was performed at another locale. There appears to have been an overwhelming selection preference for locally available microcrystalline and macrocrystalline materials. This is not surprising, given the fact that chert cobbles and outcropping quartzite beds, with suitable material for tool manufacture can be found on the terraces and side slopes leading down into the Purgatoire River. Though some heat treatment is evident, most of the local materials seem to have high conchoidal fracture properties.

Ten tools representing four tool classes were recorded in the stone tool assemblage. These are four non-bipolar cores, three bifaces, two retouched/utilized flakes, and one large battered core-tool. The cores are argillite, chert, basalt, and rock quartz; the core-tool is made on an unmodified cobble of quartz. Both retouched/utilized flakes are broken. The obsidian specimen (FS 6) exhibits heavy use wear on the > 45 degree right lateral edge. Moderate scraping (>45 degree) wear is visible on the right lateral edge, and cutting wear (<45 degrees) is seen on the left lateral edge of the fine-grained quartzite specimen (FS 9). All of the bifaces are broken; both FS 13 and FS 8 were so highly fragmented that they could not be classified in the Anderson (1989) system. The unfinished fine-grained quartzite biface (FS 8) may be the base of a nearly finished lanceolate projectile, and the argillite biface (FS 13) appears to be a side-notched projectile point fragment (Figure 4.3). The coarse-grained quartzite biface (FS 12) is classified as unfinished with no apparent use wear on either edge.

The ground-stone artifact classes include mano fragments (2), complete mano (1), polishing stone (1), basin metate fragment (1), and bedrock metate (1). The manos are made on waterworn quartzite (2) and sandstone (1) cobbles. All other ground-stone items are sandstone.

Interpretation and Summary

The site exhibits soil deposits of up to 40 cm and a thermal feature that may indicate the presence of intact buried deposits. The ground- and chipped-stone tools at the site indicate the primary site activities were raw material reduction, early-stage biface manufacture, and food processing. The presence of a hearth suggests cooking and possible habitation. Nonlocal materials (including Cerro del Medio obsidian from New Mexico), projectile point fragments, and considerable ground stone are useful for addressing the research domains of chronology, subsistence, trade and exchange, and possibly paleoenvironment. However, artifact density is low, and there are no clearly defined artifact concentrations. The area of the site within the mechanized training zone is badly eroded and unlikely to yield additional data bearing on the research domains. Therefore, while the site as a whole should be nominated for the National Register, that part of the site in the active training area of the PCMS is considered insignificant.

5LA8023

The site consists of a large lithic scatter with a dense concentration of lithics (Feature 1) near its southern border (Figures 4.4 and 4.5). It is found on the western side of an unnamed drainage that feeds Van Bremer Arroyo. The confluence of Van Bremer Arroyo and this unnamed drainage is located 340 m south, and standing water can be found at this locale. The site is set in a grassland plant community, with sparse juniper tree cover near the drainage. The more prominent plant species noted at the surface are *Yucca glauca* (small soapweed), *Opuntia phaeacantha* (prickly pear), *Opuntia imbricata* (tree cholla), *Hilaria jamesii* (galleta), and *Bouteloua gracilis* (blue grama). For the most part, soils around the site are shallow, with many areas of exposed outcropping sandstone near the eastern site boundary. These soils are characterized as a light-brown, sandy loam.

Features

Feature 1 is a 20-x-15 m concentration of lithic debitage. It is located 40 m southwest of the site datum. The overwhelming majority of the flakes recorded in this feature are made of argillite and show that all phases of lithic reduction occurred here. Both side/end scrapers (FS 9 and FS 10) were recovered from this location. This area is covered with rather dense vegetation, making it less prone to erosion. It sits at least 50 cm above the modern ground surface and likely contains intact cultural deposits.

Lithic Artifacts

Tool classes noted at the surface include debitage, patterned chipped-stone tools, and ground stone. A 150 piece sample of debitage from the surface of the site was analyzed. Table 4.2 summarizes the debitage artifacts by material type. Locally available argillite (70%) and

hornfels/basalt (19%) are the dominant materials, with lesser amounts of chert (4%), quartzite (3%), silicified wood (1%), obsidian (1%), and quartz (1%). The geological source for the obsidian specimen is the Polvadera Peak area of the Jemez Mountains of New Mexico. This suggests some nonlocal lithic materials were brought into the area by seasonal movement or in exchange with people from central New Mexico. The assemblage mainly contains simple flakes (61%), with some complex flakes (27%), shatter (8%), and biface-thinning flakes (4%) also seen. Seventy-eight percent of the debitage specimens are noncortical, and 22% show some degree of dorsal cortex. In the cortical items, 14% are large flakes and 8% are small. This reflects an emphasis on raw material reduction with all stages represented. It appears, for the most part, that many of the cores were initially roughed out at the quarry and brought to the site in noncortical form. Once on site, these were manufactured into early-stage bifaces or used to produce flakes.

Ninety-three (62%) of the debitage specimens were recorded in Feature 1 (Table 4.3). Of these, 51 are simple flakes, 33 are complex flakes, six are biface-thinning flakes, and three pieces are shatter. Material types for this group are argillite (90), chert (1), basalt (1), and obsidian (1). All reduction stages are represented in the argillite sample, with large, noncortical flakes (44%); small, noncortical flakes (36%); large, cortical flakes (12%); and small, cortical flakes (8%) recorded. These data indicate that Feature 1 functioned chiefly as an argillite reduction area, with some parent nodules or cobbles reduced. This is not surprising, considering that argillite outcrops along the edge of the hogback, which is 2 kilometers southwest. Most of the activity appears to revolve around the manufacture of large, unfinished to finished biface tools. Based on the six argillite biface-thinning flakes, at least one biface was manufactured or reworked on the site.

The chipped-stone tool classes are scraping tool (3), projectile point (2), unfinished biface (1), bifacial core-tool (1), non-bipolar core (1), and uniface (1). The scrapers are further classified as two end/side scrapers and one side scraper. The side scraper (FS 3) is basalt and exhibits light use wear on both lateral edges. The end/side scrapers (FS 9 and 10) are chert and display heavy use on both lateral edges and the distal end. Heavy use wear on both steep (>45 degree) lateral edges was noted on the Alibates dolomite uniface (FS 1). Modification is light to moderate, and this tool likely represents an early-stage side scraper. The coarse-grained quartzite biface (FS 2) is large and very thick. No use wear is evident on the edges, though platform preparation is clearly visible. It likely was broken in the early stage of manufacture. The quartzite core and basalt core-tool were analyzed in the field and not collected. Overall, the tool assemblage suggests hide-scraping functions were a dominant site activity and expedient tools were not in use.

Only one of the projectile points recovered from the surface of this site is temporally diagnostic (Figure 4.6). This point (5LA8023.0.4) is similar to Anderson's (1989) Type P1 and is made of quartzite. This type is associated with two sets of dates, the first ranging from 8500 BC to 7700 BC and the second extending from 6500 BC to 5900 BC. The second projectile point (5LA8023.0.5) is chert, and it is so highly fragmented that it cannot be typed. Based on the P1 projectile, the site had one occupation in the Plano period of the Paleoindian stage.

A single one-hand mano fragment (FS 4) represents the ground stone. This artifact is made of sandstone and exhibits moderate intensity surface grinding on one face (11 x 5 cm).

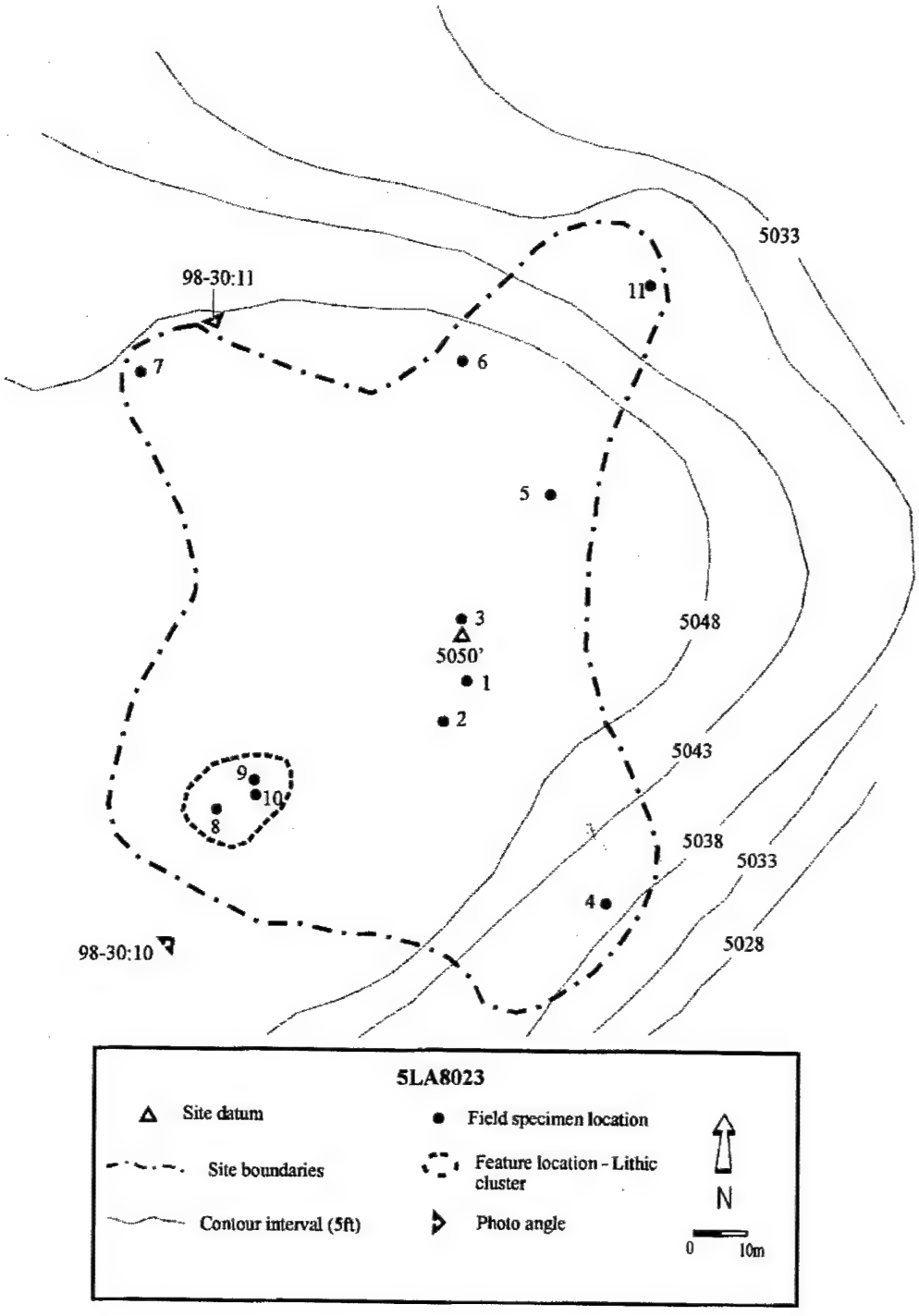


Figure 4.4: Site map, 5LA8023.

Table 4.2: Summary Description of Chipped-Stone Debitage for 5LA8023.

	Argillite	Chert	Quartzite	Hornfels/Basalt	Obsidian	Quartz	Silicified Wood
Total	105	7	5	29	1	1	2
Large	55	4	3	18	0	1	1
Small	50	3	2	11	1	0	1
Cortical	21	0	1	9	0	1	1
Noncortical	84	7	4	20	1	0	1
Complex	33	1	1	3	1	0	1
Shatter	5	2	1	4	0	0	0
Simple	61	4	3	22	0	1	1
Biface Thinning	6	0	0	0	0	0	0

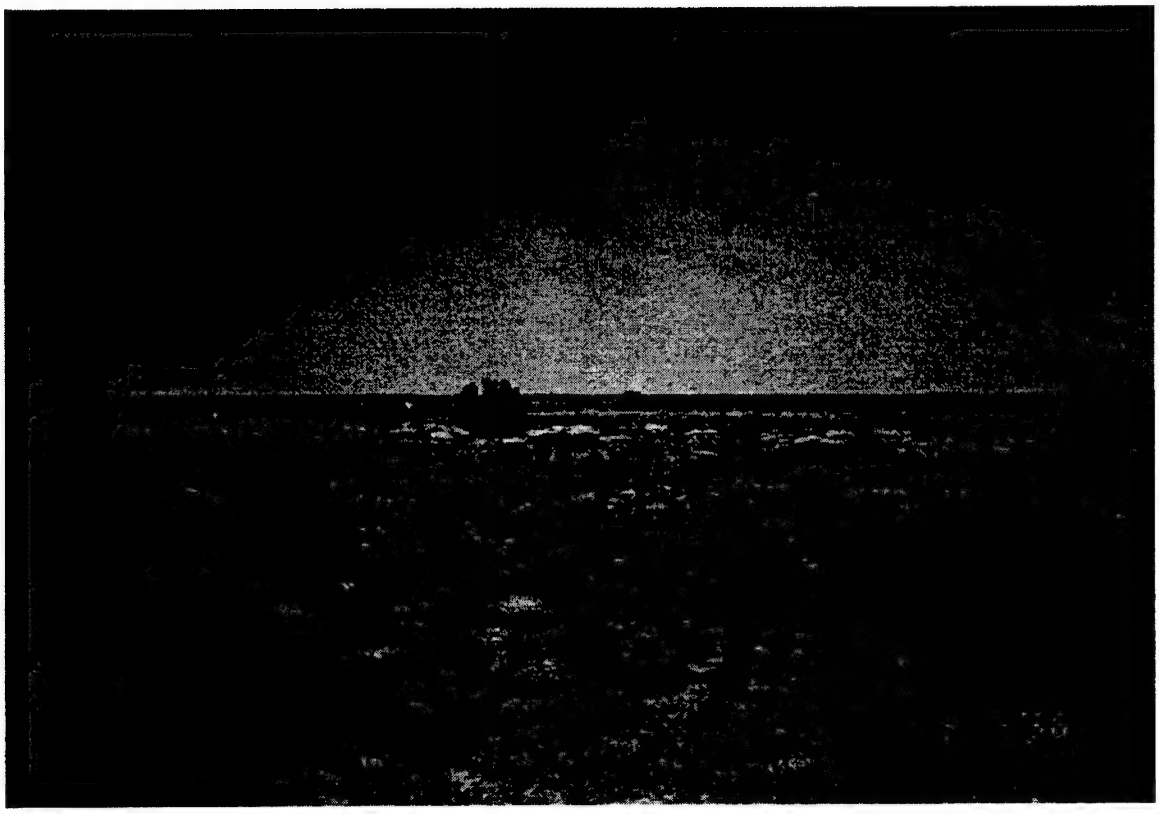


Figure 4.5: Photograph of site 5LA8023. Site overview, view facing northeast (60 degrees).

Table 4.3: Summary Description of Chipped-Stone Debitage for Feature 1, 5LA8023.

	Argillite	Chert	Hornfels/Basalt	Obsidian
Total	90	1	1	1
Large	51	1	1	0
Small	39	0	0	1
Cortical	18	0	1	0
Noncortical	72	1	0	1
Complex	31	1	0	1
Shatter	3	0	0	0
Simple	50	0	1	0
Biface Thinning	6	0	0	0

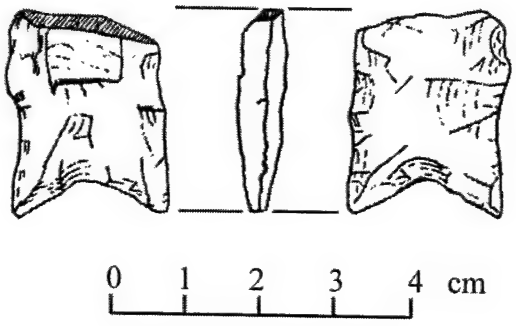


Figure 4.6: Paleoindian projectile point recovered from site 5LA8023.

Interpretation and Summary

Site 5LA8023 is a lithic scatter that likely served as a reduction location for locally available argillite. The lack of thermal features and expedient flake tools suggests this was not a habitation location. Paleoindian sites are relatively rare on the PCMS, and this site may provide important chronological information about this poorly known period of time. This site is large, with as much as 50 cm of soil deposition in and around Feature 1. Test excavations may reveal the presence of data such as pollen, macrobotanical, and/or faunal remains which could be useful for reconstructing paleoenvironment and subsistence patterns. In addition, Alibates dolomite and Jemez Mountain obsidian were also recovered from Feature 1 and may contribute to an understanding of trade and exchange. Based on the presence of a Plano Period projectile point and the probability of encountering intact subsurface deposits through test excavation, we recommend that this site be nominated for the National Register of Historic Places.

5LA8024

The site is located on the eastern terrace above an unnamed side drainage that flows south for 600 m into Van Bremer Arroyo (Figures 4.7 and 4.8). This .43-acre lithic scatter occupies the side of a gently (1 degree) east to west sloping hillside. It is located on grassland, with sparse juniper trees along the terrace edge. On-site vegetation includes soapweed, prickly pear cactus, tree cholla, rabbitbrush, and blue grama. No formal features were identified in the light-brown sandy loam soil. Soil depths vary throughout the site, with depths of up to 30 cm noted in animal burrows. A resistant layer of sandstone caprock is exposed at the western site boundary. Tank tracks are present across the site's surface, and a modern two-track road runs along the southern site border.

Only ten pieces of chipped-stone debitage (Table 4.4) were recovered at the surface, and these were widely scattered. Two material types are present, and both are sourced to the hogback, which is located 1.8 kilometers to the southwest. Of the debitage, seven pieces are basalt and three are argillite; seven are classified as large items, while three are small. These are further classified as simple flakes (6), complex flakes (3), and shatter (1). Only the shatter specimen shows cortex. The small overall count makes this site difficult to interpret. The site likely functioned as a raw material reduction area, with the cortex from the original source material removed at the quarry. Flakes removed from these raw materials were likely used for expedient cutting tools, though only one specimen shows visible use wear.

Lithic Artifacts

The tool assemblage consists of a lanceolate projectile point fragment and one utilized flake. The utilized flake (FS 2) is made on a cortical piece of basalt with light usage on both steep (>45°) lateral edges. The chert projectile point (5LA8024.0.1) is a basal fragment and resembles Anderson's (1989) Type P1 (Figure 4.9). Based on the literature, it is a late Paleoindian Stage point with associated dates of either 8500 BC to 7700 BC or 6500 BC to 5900 BC.

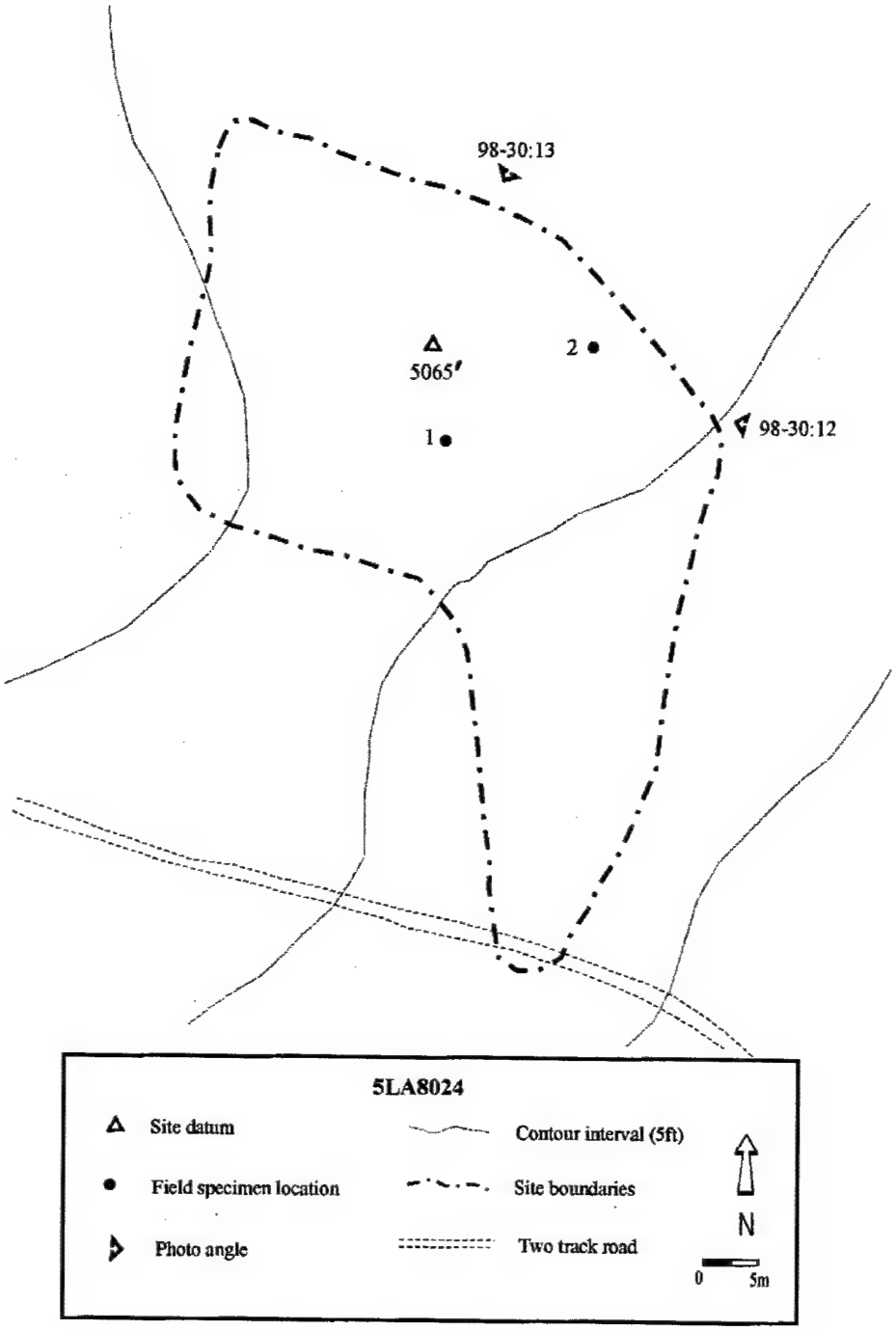


Figure 4.7: Site map, 5LA8024.

Figure 4.8: Photograph (98-30:13) of site 5LA8024, datum in foreground.

TABLE 4.4: Summary Description of Chipped-Stone Debitage for 5LA8024.

	Argillite	Hornfels/Basalt
Total	3	7
Large	1	6
Small	2	1
Cortical	0	1
Noncortical	3	6
Complex	1	2
Shatter	0	1
Simple	2	4

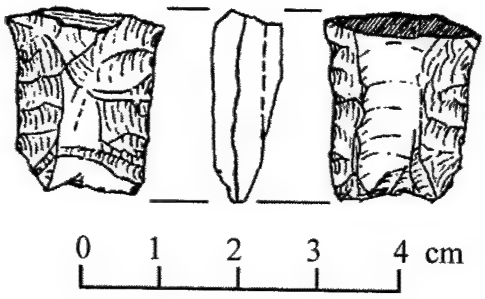


Figure 4.9: Paleoindian projectile point from site 5LA8024.

Interpretation and Summary

Although the site has low artifact density, the presence of a Paleoindian point makes this site eligible for the National Register of Historic Places. Its association with site 5LA8023 (250 m southwest) suggests the drainage area in between was a favored location for Paleoindians, or this is one of the few locations on the PCMS where intact late quaternary deposits can be found. With deposits of up to 30 cm seen, subsurface testing could reveal additional artifacts. Pollen, macrobotanical, and faunal remains useful for reconstructing paleoenvironment and subsistence patterns could also be recovered here.

5LA8028

The site consists of a number of petroglyphs pecked on basalt boulders of varying sizes and shapes (Figures 4.10 and 4.11). It is located on the northern fringe of the hogback, on both sides of a southern side drainage that flows into Van Bremer Arroyo (40 m north). Juniper trees, soapweed, saltbush, rabbitbrush, greasewood, wheat grass, blue grama, and sunflowers were growing on the site when it was recorded in June. The surface soil is a compact, light-brown, silty loam, with a depth of 6 cm noted in between the numerous basalt blocks that litter the surface.

Features

A total of eight rock art panels were observed and recorded. Six prehistoric rock art panels depict random stipple-pecks, zigzag lines, semi-oval figures with lines, an anthropomorphic figure, a curved line and pecked dots, and a branching and meandering line. Two historic panels depict hearts and pecked initials.

Panel 1, Feature 1 is located approximately 34 m and 355 degrees from the site datum. It is a broad line which was stipple-pecked across the face of a large (55 x 44 cm) basalt boulder (Figure 4.12). Light weathering due to wind and water exposure is evident.

The second rock art panel is located 25 m and 346 degrees from the site datum (Panel 2, Feature 2). It includes a zigzag line (possible snake-like figure) and a series of connected lines (Figure 4.13). Both are solid-pecked elements that show rather heavy design patination. This panel measures 40 x 31cm and faces southeast at an angle of 162 degrees.

The third rock art panel consists of four separate elements and includes a line with small crook at one end; two semi oval figures with curved, branched, and zigzag lines attached; one small, curved amorphous shaped figure; and a broken zigzag line (Figure 4.14). All are solid-pecked into a large basalt boulder (50 x 49 x 25 cm) that has recently broken into three separate pieces due to mechanized vehicle traffic. No lichen is present on any of the elements, though heavy patination is visible. This panel (Panel 3, Feature 3) is located 26.5 m and 339 degrees from the site datum.

An anthropomorphic figure (Panel 4, Feature 4) is found on an angular basalt boulder 23 m and 340 degrees from the site datum (Figure 4.15). This element is solid-pecked, shows heavy patination, and has been exposed to light weathering. The panel measures 38 x 18 cm and faces west at 280 degrees.

Panel 5, Feature 5 shows three identifiable elements-- two sets of pecked dots (Elements b and c) and a small curved line (Figure 4.16). All three figures were produced by both scratching and solid-pecking techniques and are found on the southern end of a large (60 x 31 x 31 cm) basalt boulder. The panel faces east-southeast at 120 degrees and is located 24 m and 326 degrees from the datum.

Panel 6, Feature 6 is located on the western site boundary 52 m and 257 degrees from the datum. It is solid-pecked onto a small basalt boulder in the form of a branching, meandering line (Figure 4.17). Overall, this panel measures 22 x 25 cm and is oriented to face west at 282 degrees. Light patination is visible over the figure, and wind and water exposure has caused light deterioration.

The historic panels were labeled Panels 7 and 8 (Features 7 and 8, respectively). Pecking was used on both; however, on Panel 8 the shape of the heart was incised onto the panel first, and only pecking completed the top portion (Figure 4.18). Panel 7 is quite detailed, with the initials "LED" and "FWO" pecked on the inside of a heart (Figure 4.19). The letters "EDL" and the numbers "30" and "8" (possibly a brand) appear outside the heart. Both panels are located at the southern site boundary. Panel 7 is 26 m and 171 degrees from the datum, and Panel 8 is at 33 m and 192 degrees.

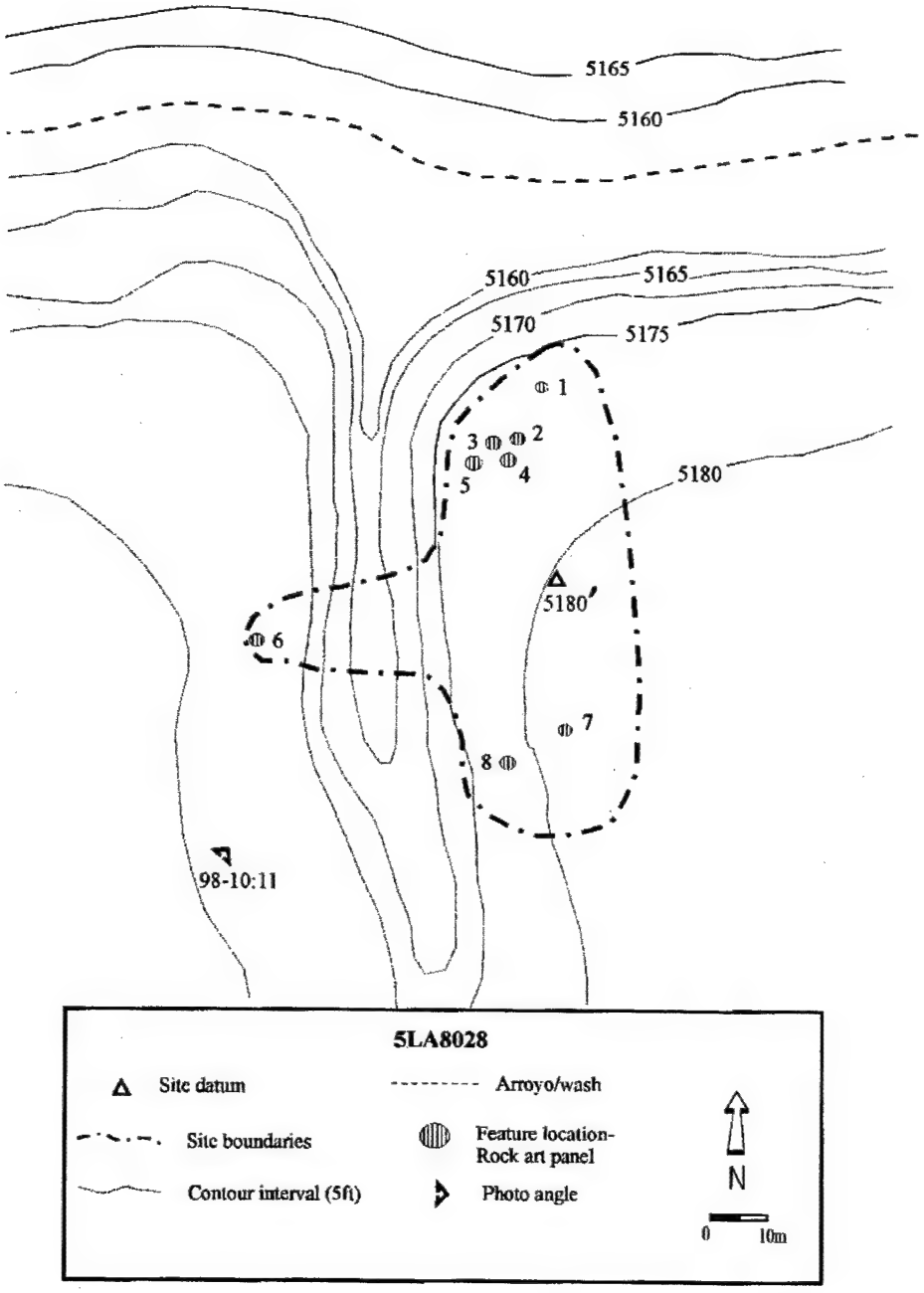


Figure 4.10: Site map, 5LA8028.

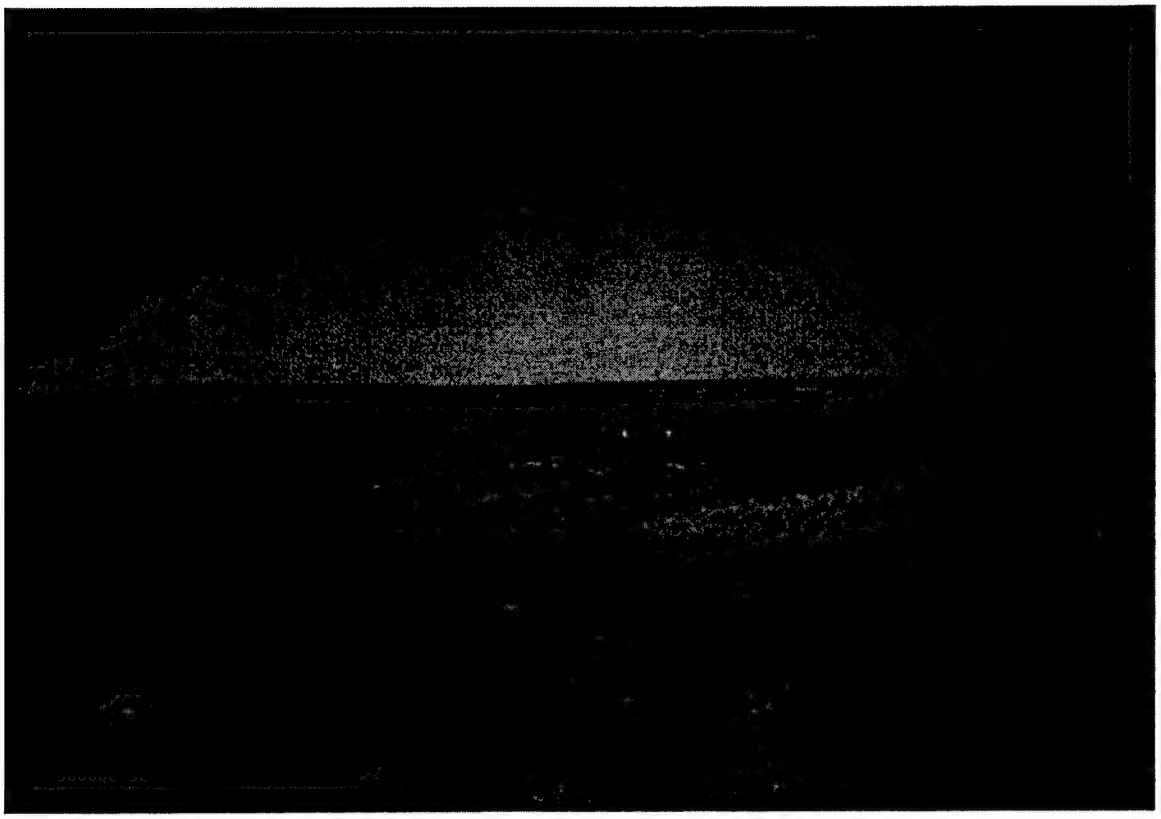


Figure 4.11: Photograph of site LA8028, site is on both sides of the arroyo; taken facing northeast (45 degrees). Negative 98-10:11.

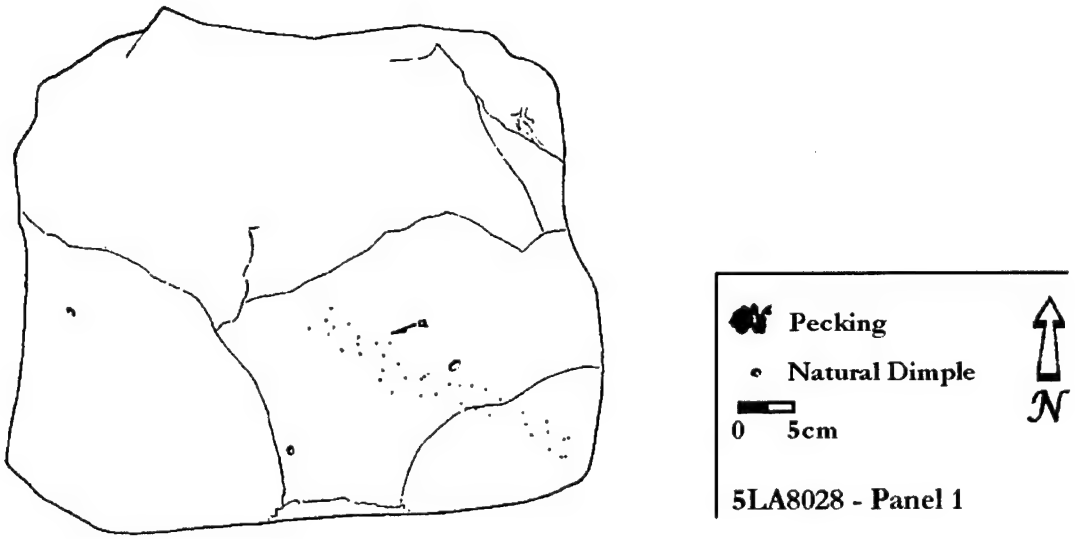


Figure 4.12: Petroglyph Panel 1, 5LA8028.

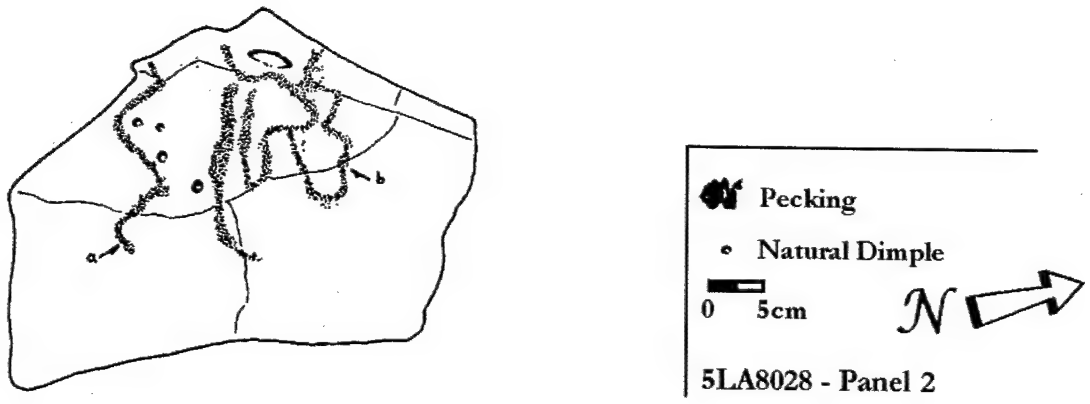


Figure 4.13: Petroglyph Panel 2, 5LA8028.

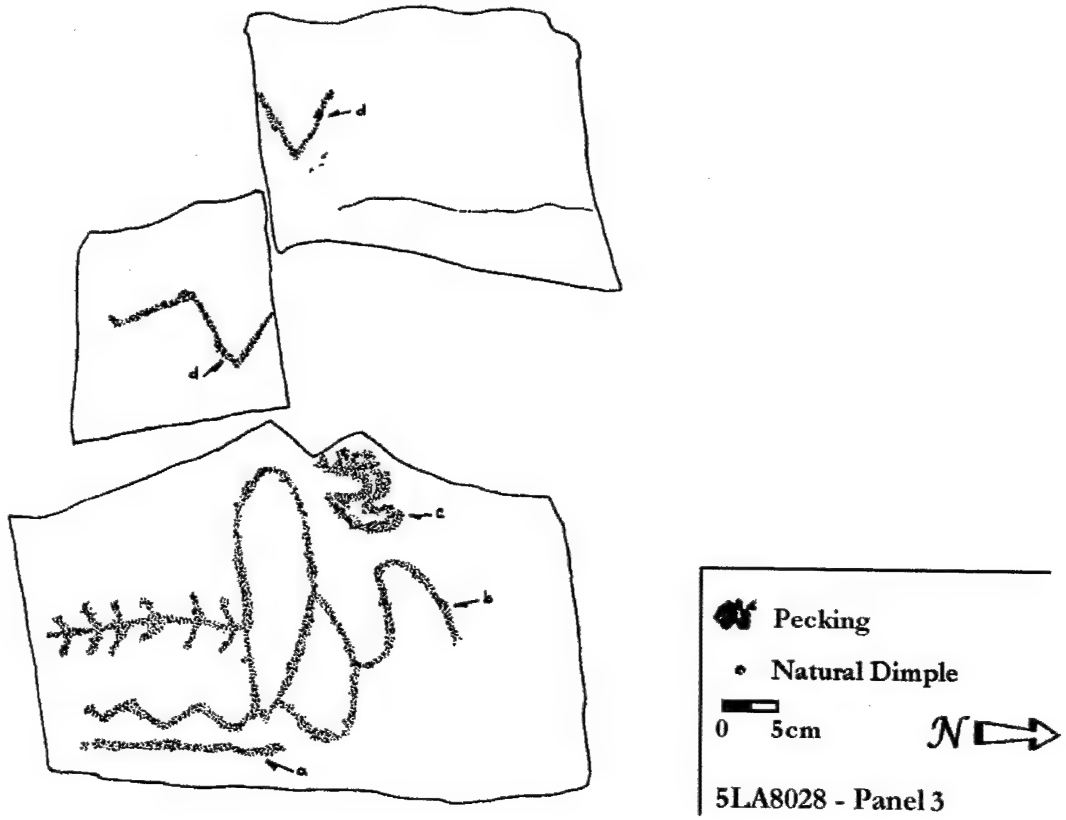


Figure 4.14: Petroglyph Panel 3, 5LA8028.

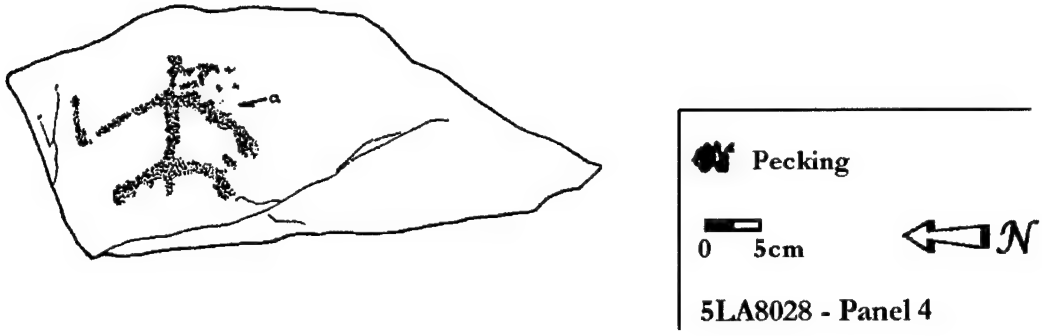


Figure 4.15: Petroglyph Panel 4, 5LA8028.

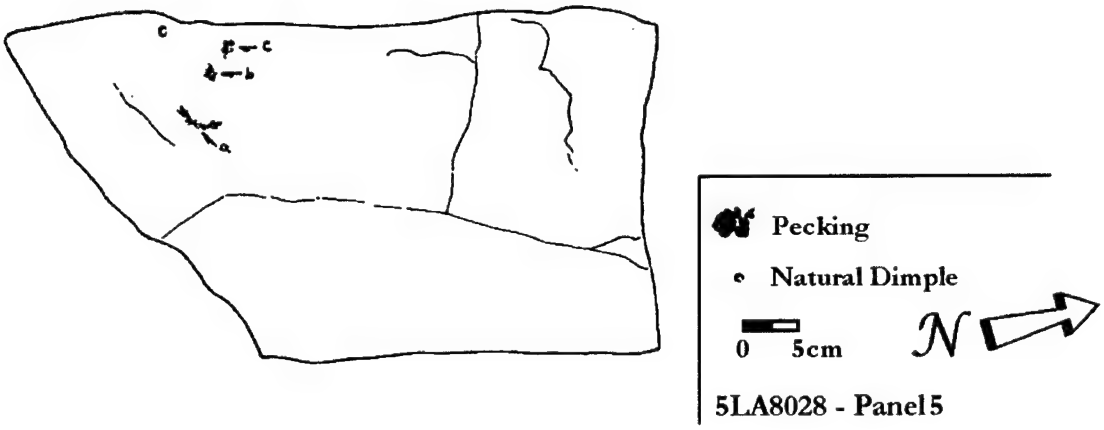


Figure 4.16: Petroglyph Panel 5, 5LA8028.

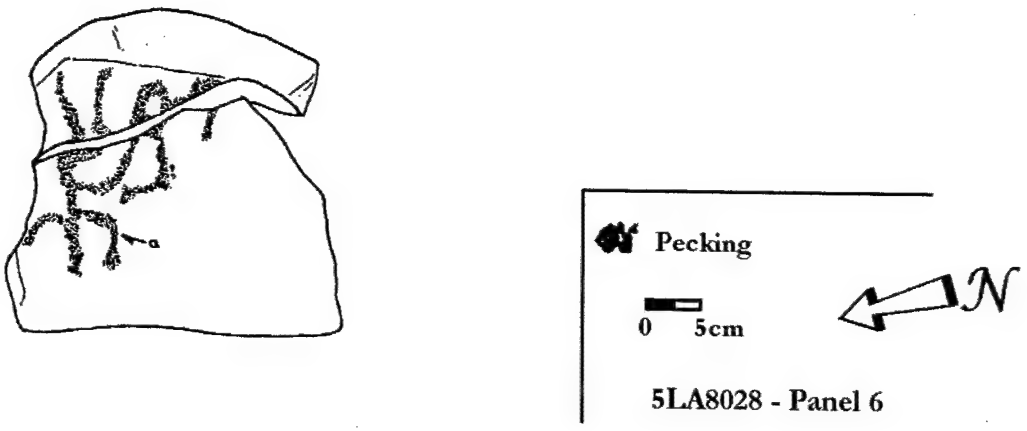


Figure 4.17: Petroglyph Panel 6, 5LA8028.

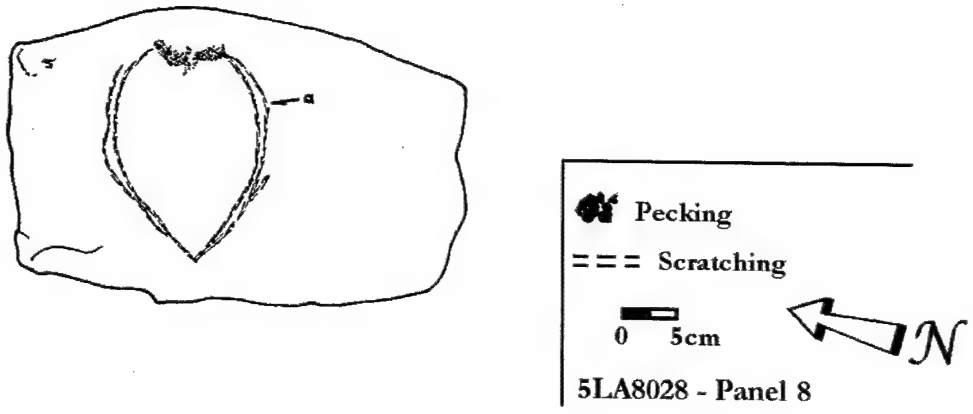


Figure 4.18: Petroglyph Panel 8, 5LA8028.

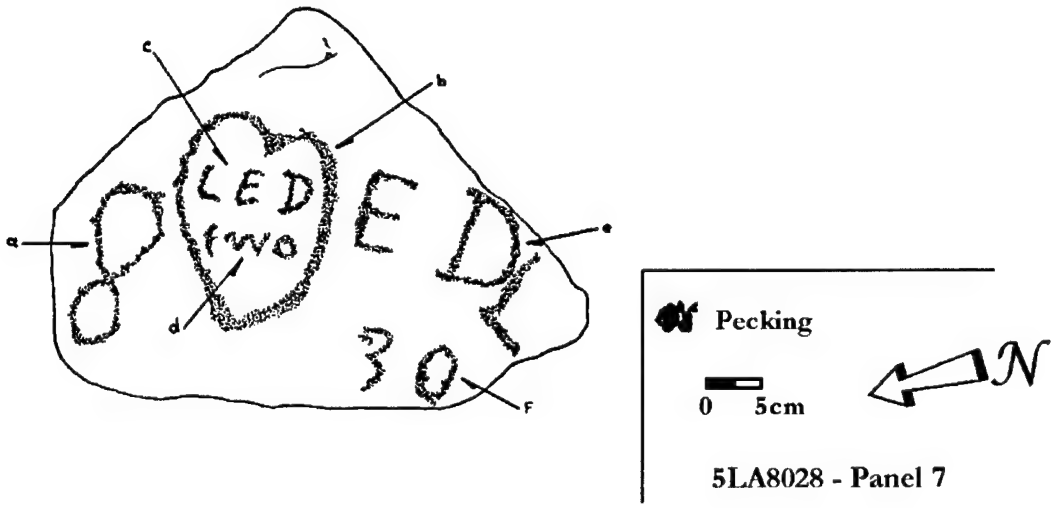


Figure 4.19: Petroglyph Panel 7, 5LA8028.

Interpretation and Summary

The site is considered to be eligible for nomination to the NRHP because it may provide both temporal data in the rock art styles and information concerning the ideological traditions of the prehistoric inhabitants of the region. U.S. Military activities (tanks and/or other vehicles) have already caused splitting of two of the rock art panels, and other boulders in the vicinity exhibit scarring from maneuvers. The prehistoric component of this site should be nominated to the National Register, and the area containing the rock art panels should be fenced. This site is one of the few small rock art sites in the area and may represent a discrete period of use. The elements on this site were produced by both solid- and stipple-pecking techniques. Elements of this style (pecked curvilinear and human stick figures) show a date range from Middle Archaic to the Developmental Period. In the hogback area of the PCMS, similar figures are Archaic in age (Loendorf 1989). An historic homestead is located across Van Bremer Arroyo, approximately 1.5 km to the northeast. Historic rock art has been recorded at that site, and Panels 7 and 8 could be associated with it.

5LA8037

Site 5LA8037 is a large lithic scatter, with a single rock structure identified as the remnant of a stone ring, located on the north side of Van Bremer Arroyo and 800 m northeast of the southeast end of the hogback (Figures 4.20 and 4.21). The site overlooks a permanent water source (spring) which is located 300 m south. The site is set just above the canyon rim, and the terrain slopes north to south with a 6 percent grade. Because it is located in a high gradient area, the silty loam soils are subject to moderate runoff erosion. Observed soil depths range from 1 to 30 cm, based on gouges left by mechanized vehicle traffic at the surface.

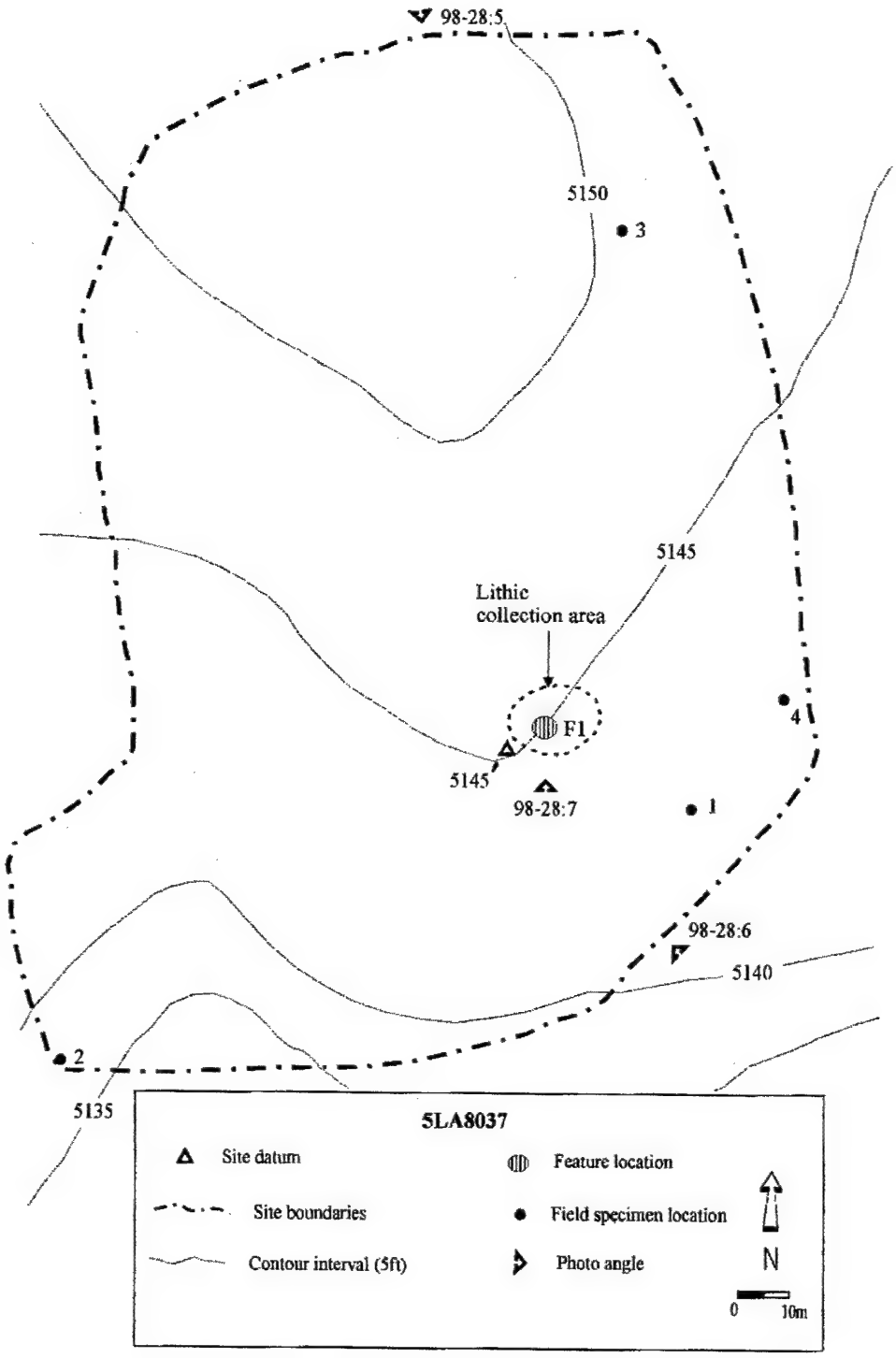


Figure 4.20: Site map, 5LA8037.

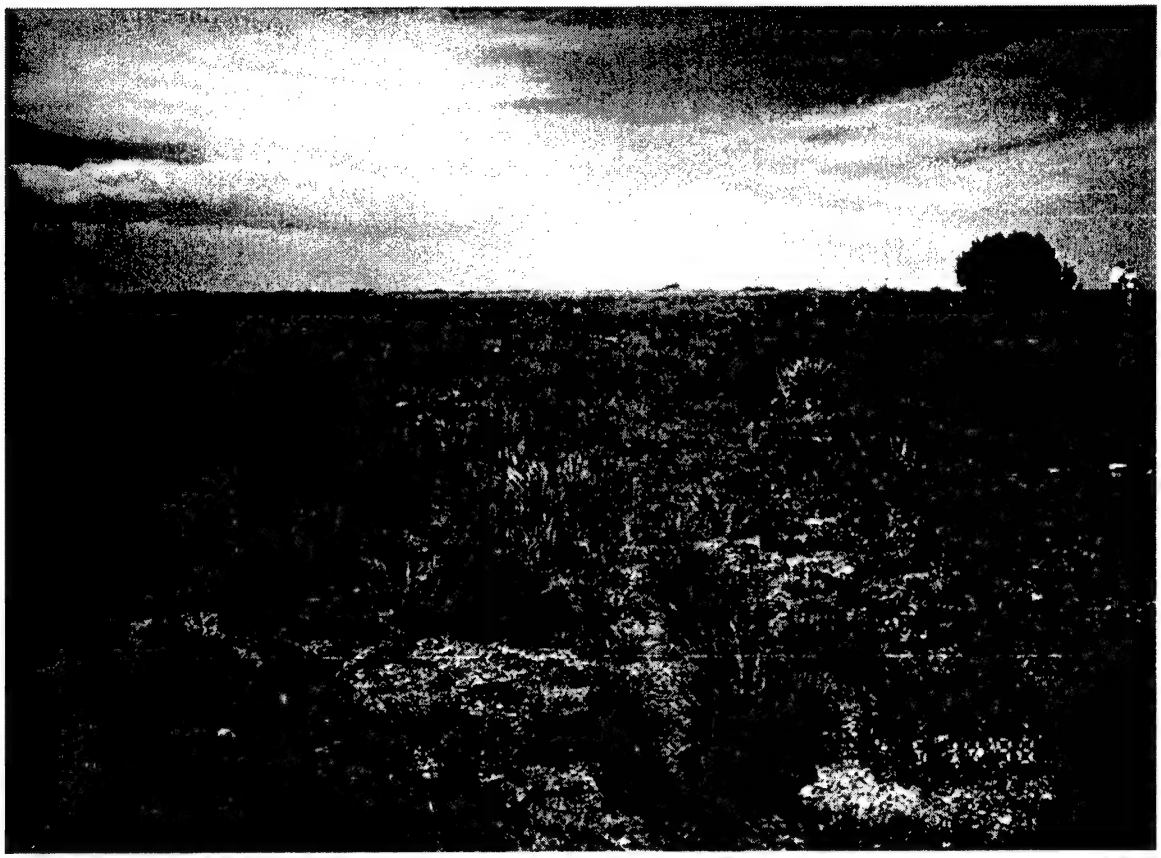


Figure 4.21: Photograph of site 5LA8037. View upslope facing north (360 degrees).

Table 4.5: Summary Description of Chipped-Stone Debitage for 5LA8037.

	Argillite	Chert	Hornfels/Basalt	Obsidian	Quartz
Total	148	1	1	1	1
Large	69	0	0	0	1
Small	79	1	1	1	0
Cortical	28	0	0	0	0
Noncortical	120	1	1	1	1
Complex	50	0	1	1	1
Shatter	5	1	0	0	0
Simple	88	0	0	0	0
Biface Thinning	5	0	0	0	0

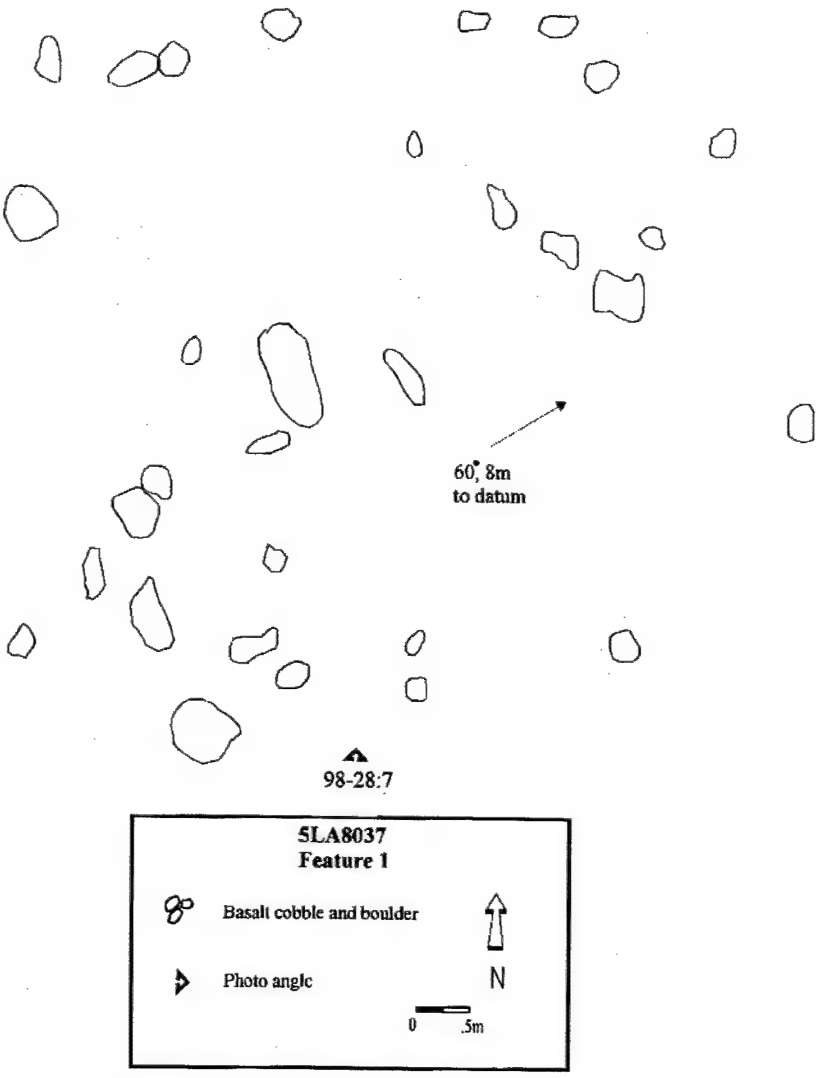


Figure 4.22: Planview, Feature 1, 5LA8037.

A grassland plant community, covering the stable portions of the site, grades into woodland and shrub communities on the slopes leading down into the arroyo. Black and hairy grama, soapweed, prickly pear cactus, and juniper trees are the most abundant plant species on the site.

Features

Feature 1, a roughly circular stone ring approximately 6.5 m in diameter, is 7 m northeast of the datum (Figure 4.22). It is constructed with the same large basalt cobbles that are found throughout the area. A pin flag probe revealed at least 20 cm of possible cultural depth.

Lithic Artifacts

One hundred fifty-two pieces of chipped-stone debitage were sampled randomly from an area around Feature 1. These artifacts consist of 88 simple flakes, 53 complex flakes, 6 pieces of shatter, and 5 biface-thinning flakes. None of the debitage specimens were recovered from directly within Feature 1.

Table 4.5 presents the data on debitage type by material type. The majority (97%) of the debitage is argillite. The remaining three percent is chert, basalt, obsidian, and crystal quartz. Of the argillite items, 53% are classified as small and 47% are large. The majority (81%) is noncortical and fewer specimens (19%) show dorsal cortex. Nearly half (49%) of the debitage specimens are small noncortical flakes. Large cortical items are 15% of the assemblage, small cortical items are 4%, and large noncortical items are 32%. Most of the argillite debitage was produced during the manufacture of early- to late-stage bifaces. Raw material reduction was also performed on the site based on the large and small cortical flakes. The specific geological source for argillite in the PCMS is the hogback, and it is not surprising that this material dominates the assemblage. It appears the raw material was initially reduced near the hogback, then brought to the site as prepared cores or early-stage bifaces. Trace element analysis reveals that the obsidian flake is from the Cerro del Medio source in New Mexico, and the lack of cortex indicates it was not transported to the site in nodule form.

Unfortunately, no temporally diagnostic materials, such as projectile points or ceramics, were recovered from the surface. The recorded chipped-stone tools are made of argillite and include one unfinished biface fragment (FS 2), one bifacial core-tool (FS 3), and one end/side scraper (FS 4). The scraper is complete, and shows heavy use wear and retouch modification (>45 degree) on both lateral edges and the distal end. No ground stone was noted.

Interpretation and Summary

Little can be said about how the site fits into the regional chronology. This is a large site with high artifact density, but very little diversity in materials and very few tools were present. Based on the large amount of argillite materials, it is likely this site was related to the procurement of raw material from the hogback. The site exhibits some soil deposition, which may be covering intact cultural deposits. The recorded stone structure (Feature 1) has approximately 20 cm of deposition and may contain intact occupational surfaces. A number of additional stone rings may be present on the site; however, it is difficult to define them because of the presence of scattered basalt cobbles throughout this region. Testing around Feature 1 and other possible structures has good potential for yielding pollen, faunal, and macrobotanical data useful for reconstructing paleoenvironment and subsistence. The site is threatened by army maneuvers. The area around Feature 1 should be test excavated or fenced for its protection. We recommend that the site be determined eligible for the National Register of Historic Places because it is likely to yield information important to our understanding of prehistory.

5LA8062

The site is a moderate- to high-density lithic scatter and thermal feature situated south of Burke Arroyo. Site 5LA3411 is nearby. Site 5LA8062 is on a gently sloping terrace with several minor drainages and cutbanks along its northern edge. This 11.2-acre site also extends from the side of a small southwest to northeast trending ridge and down into the drainage bottom (Figures 4.23 and 4.24). The site is located in the BOGR/HIJA (Table 2.1) grassland vegetative community typical of the western PCMS. Fourwing saltbush, foxtail barley, sideoats and blue grama, needle and thread grass, prickly pear, and tree cholla were seen growing on the site. Soil depths vary throughout the site, with thin deposits near the base of the ridge and deeper deposits (up to 50 cm) noted in the arroyo cutbanks.

Features

Feature 1 is a concentration of thermally altered rocks measuring approximately 1 m in diameter, and it is eroding out along the south edge of Burke Arroyo (71 m and 343 degrees from datum). This feature is slightly deflated, and a single tank track has gouged out the lower portion. A large amount of thermally altered rocks appear scattered on the terrace above Burke Arroyo, and perhaps more features are buried at this location.

Lithic Artifacts

One hundred forty-nine pieces of debitage were recorded in a 20-m (arbitrary) dog leash sample area (Table 4.6). This sample area contained 69 complex flakes, 66 simple flakes, 11 biface-thinning flakes, and 3 pieces of shatter. These were 88% argillite, 6% quartzite, 3% chert, and 3% hornfels/basalt. All the material types are locally available, and at the parent source outcrop in bed, or nodule, form. Overall, 25% of the assemblage has cortex. Most items (109) were assigned to the small size grade, with fewer (40) recorded as large. The percentage of small noncortical flakes (60%) is high in relation to most sites in the project area. This information, coupled with the lack of cores and core-tools in the tool assemblage, indicates that early- to late-stage biface reduction was responsible for generating most of the debitage. Large cortical and noncortical flakes, as well as cortical pieces of shatter, are seen in the assemblage and can be linked to reduction of prepared argillite cores. Eleven argillite biface-thinning flakes were recorded from one locale and represent a single biface manufacturing episode. No artifacts were recovered from in or around Feature 1.

Three temporally diagnostic projectile points were recovered from the surface of this site (Figure 4.25). The first point (5LA8062.0.2) is similar to Anderson's (1989) Type P10. This style dates into the Early Archaic Stage (5500 BC to 3000 BC). The second projectile point (5LA8062.0.4) is a P12 and has an assigned range of 3000 BC to AD 500, and the last point (5LA8062.0.5) is a P29 and tentatively dates between 500 BC and AD 600. Based on these artifacts, the site was continually used from the Early Archaic period to the Late Archaic period.

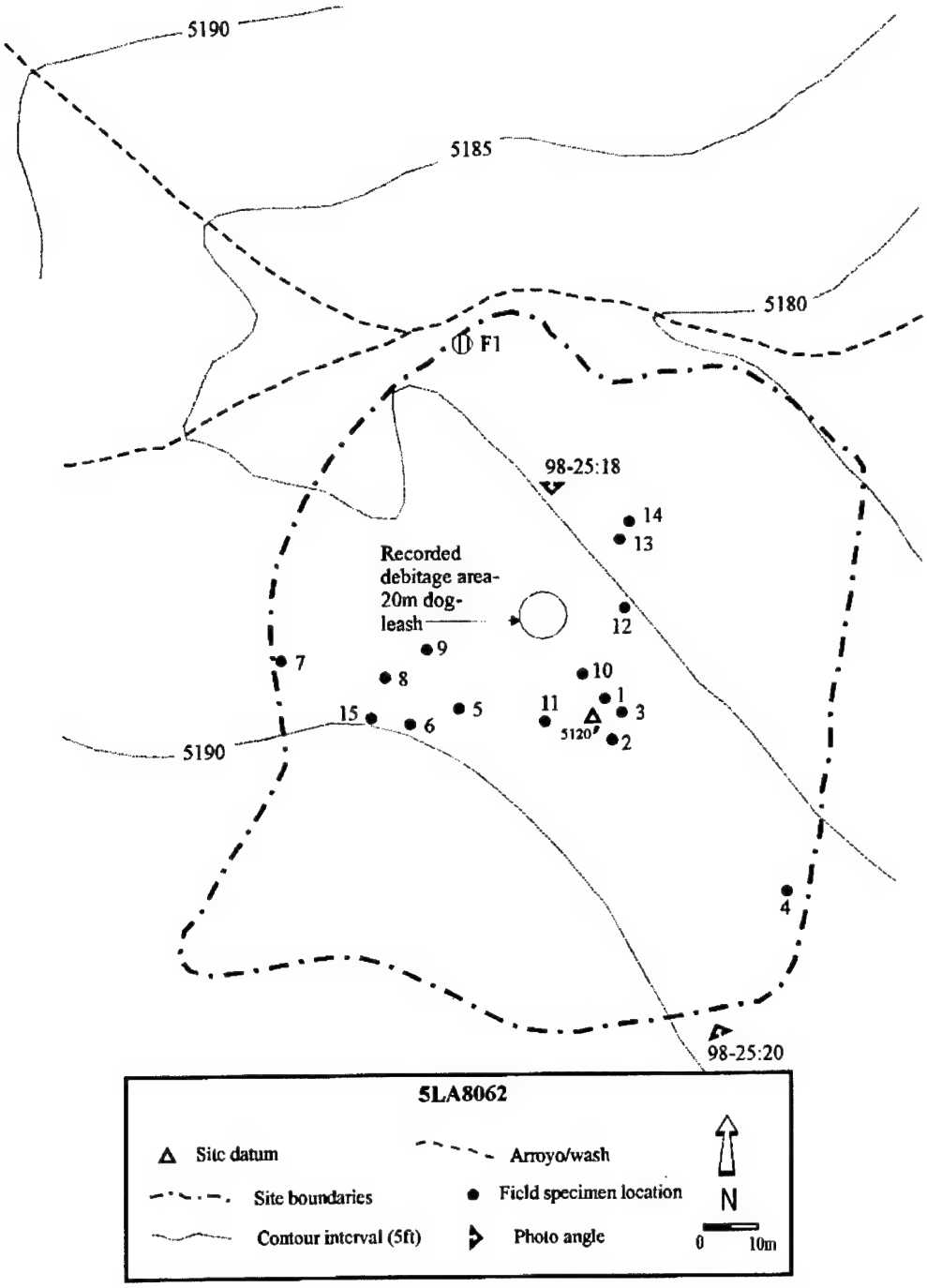


Figure 4.23: Site map, 5LA8062.

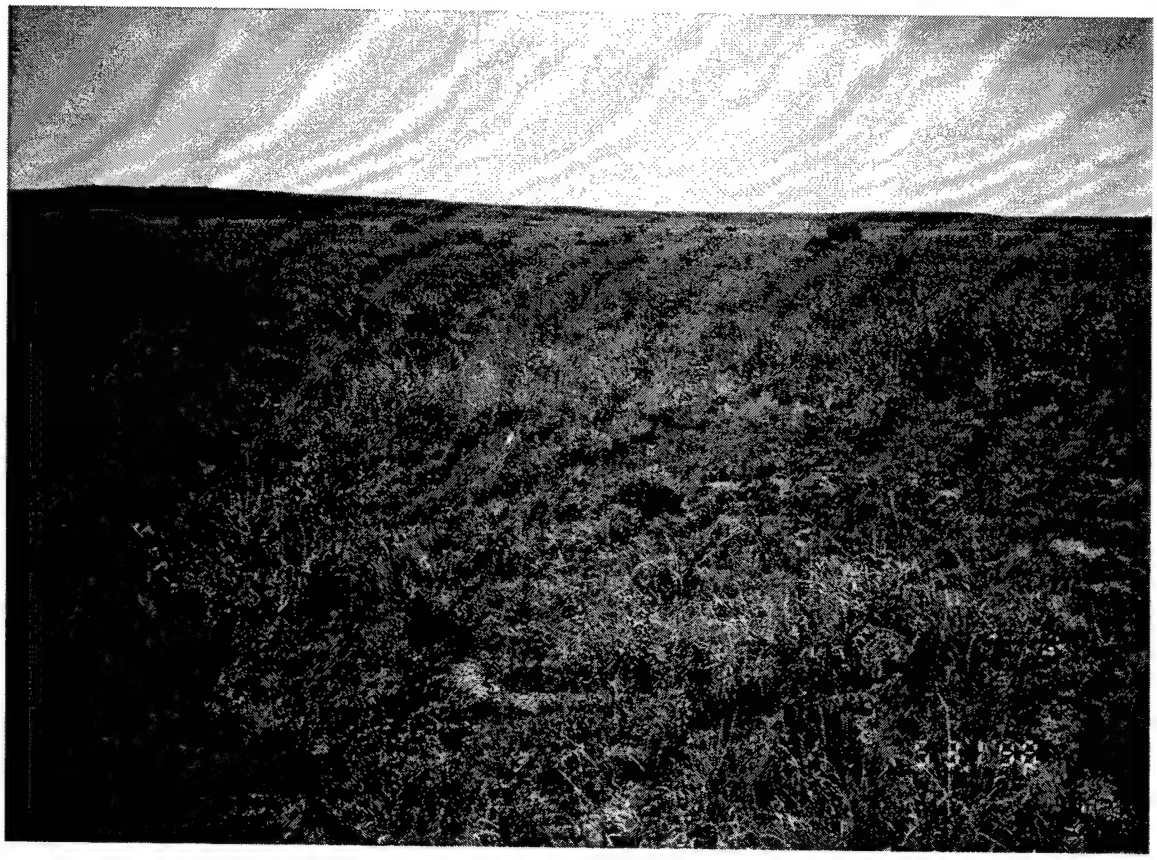


Figure 4.24: Photograph of site 5LA8062. Facing 150 degrees toward datum.

Table 4.6: Summary Description of Chipped-Stone Debitage for 5LA8062.

	Argillite	Chert	Hornfels/Basalt	Quartzite
Total	131	5	4	9
Large	33	1	3	3
Small	98	4	1	6
Cortical	33	1	1	2
Noncortical	98	4	3	7
Complex	60	4	2	3
Shatter	3	0	0	0
Simple	57	1	2	6
Biface Thinning	11	0	0	0

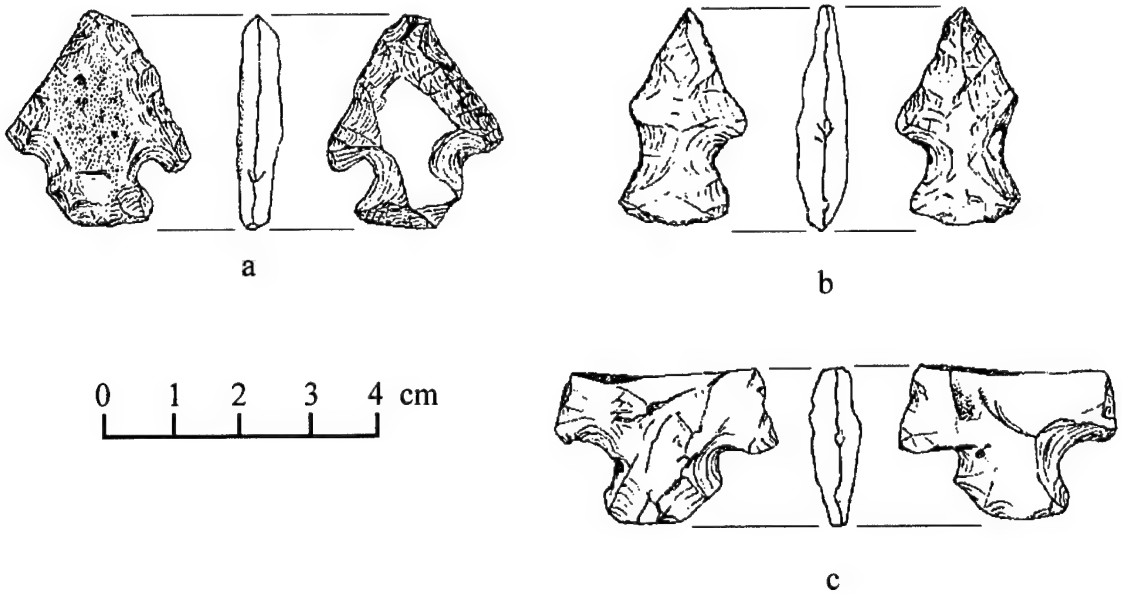


Figure 4.25: Projectile points recovered from site 5LA8062: (a) 5LA8062.0.5; (b) 5LA8062.0.2; (c) 5LA8062.0.4.

The chipped stone tools consist of six utilized flakes, and two scraping tools. The utilized flakes are argillite (4), chert (1), and basalt (1). The argillite items are two complete and two broken tools. Recorded edge angles show three specimens (FS 1, 9, and 12) with an angle of <45 degrees (cutting activity). The remaining argillite flake (FS 15) was used on both lateral edges, with one edge at <45 degrees and the other at >45 degrees. The chert specimen (FS 11) is broken and exhibits light use wear on the (<45 degree) right lateral edge. Field Specimen 3 is made of basalt, may be an early-stage end scraper, and shows light use wear on the >45 degree distal end.

The scrapers include one Alibates dolomite end/side scraper (FS 14) and one chert side scraper (FS 10). The Alibates tool is broken and shows heavy retouch modification and use wear on both lateral edges and the distal end. The broken chert scraper displays moderate retouch modification and heavy use wear on both lateral edges.

Three manos and one polishing stone comprise the ground-stone tool assemblage. All are broken (<50% complete) and have no thermal alteration evident on them. All of the manos are sandstone; two are oval in planview, and one is of unknown form. Though striation pattern is often difficult to determine in the field, one specimen was determined to have longitudinal striations. Longitudinal striations are also visible on the polishing stone.

Interpretation and Summary

This site has several temporally diagnostic projectile points and one relatively intact thermal feature. Site 5LA8062 is a large (240 meters north-south by 220 meters east-west) lithic scatter with late-stage lithic reduction, vegetal preparation, cooking, and expedient and formal tool

usage (cutting and scraping) activities occurring. The age of the points, 5500 BC to AD 600, suggests it was in use during all periods of the Archaic Stage. Considerable overbank deposition in the area of Burke Arroyo may be covering intact cultural deposits and additional thermal features. The presence of ground stone in combination with the thermal feature indicates a good potential for the recovery of macrobotanical, pollen, or faunal material through test excavations. The presence of Alibates dolomite indicates that the site may yield data pertinent to the reconstruction of trade and exchange networks. The area around Feature 1 has been impacted by military maneuvers. This portion of the site should be fenced for its protection. We also suggest that both Feature 1 and the Burke Arroyo terrace be evaluated through test excavation.

5LA8071

The site is an extensive lithic scatter located at the southern portion and southeastern fringes of a local landmark called "Gilligan's Island." It encompasses a previously recorded historic site (5LA5600) and most of the mesa top. Only the part of the mesa encompassed within the existing survey unit boundary was intensively inspected. The site boundary was arbitrarily determined using topographic features-- the eastern and western boundaries were set using the mesa top; the southern edge of the site was determined by the extent of the lithic scatter; and a small ridge top defined the northern edge. Artifacts were noted beyond the mesa top.

This 22.7-acre site overlooks the head of Burke Arroyo, and numerous small to large intermittent drainages bisect this area from northwest to southeast (Figures 4.26 and 4.27). A resistant layer of outcropping limestone forms the mesa top. Very few developed soils are present here, and the majority of the artifacts were resting on the hard surface. Near the central portion of the site the limestone bed starts to weather, and erosional deposits are noted at the surface of this 5- to 10-degree slope. In the small arroyos cutting across the eastern portion of the site, there are deposits of up to 10 cm. The site elevation ranges between 5,613 ft on top of the mesa to 5,530 ft in the drainage below.

A variety of plant communities occur within the site boundary ranging from shrubland on the mesa top to grassland in the drainage basin below. On the mesa top, the overstory is juniper and sagebrush and the understory is composed of grass species (blue grama, feathergrass, galleta, and threeawn). The limestone slopes just below the mesa contain greasewood and James frankenia as the dominant plant species. Further down the slope, sagebrush and soapweed are the dominant plants. On the colluvial slopes draining into Burke Arroyo, an alkali sacaton and galleta grass plant community exists. Additional plants found within the site boundary include wheatgrass, barley, cholla, prickly pear, hairy grama, sand dropseed, eriogonum, saltbush, rabbitbrush, winterfat, little bluestem, and sideoats grama.

Lithic Artifacts

One hundred fifty-four debitage specimens from the surface of 5LA8071 were analyzed. Debitage categories present in the assemblage include 90 simple flakes, 50 complex flakes, and 14 pieces of angular shatter. Table 4.7 presents chipped stone debitage type by material.

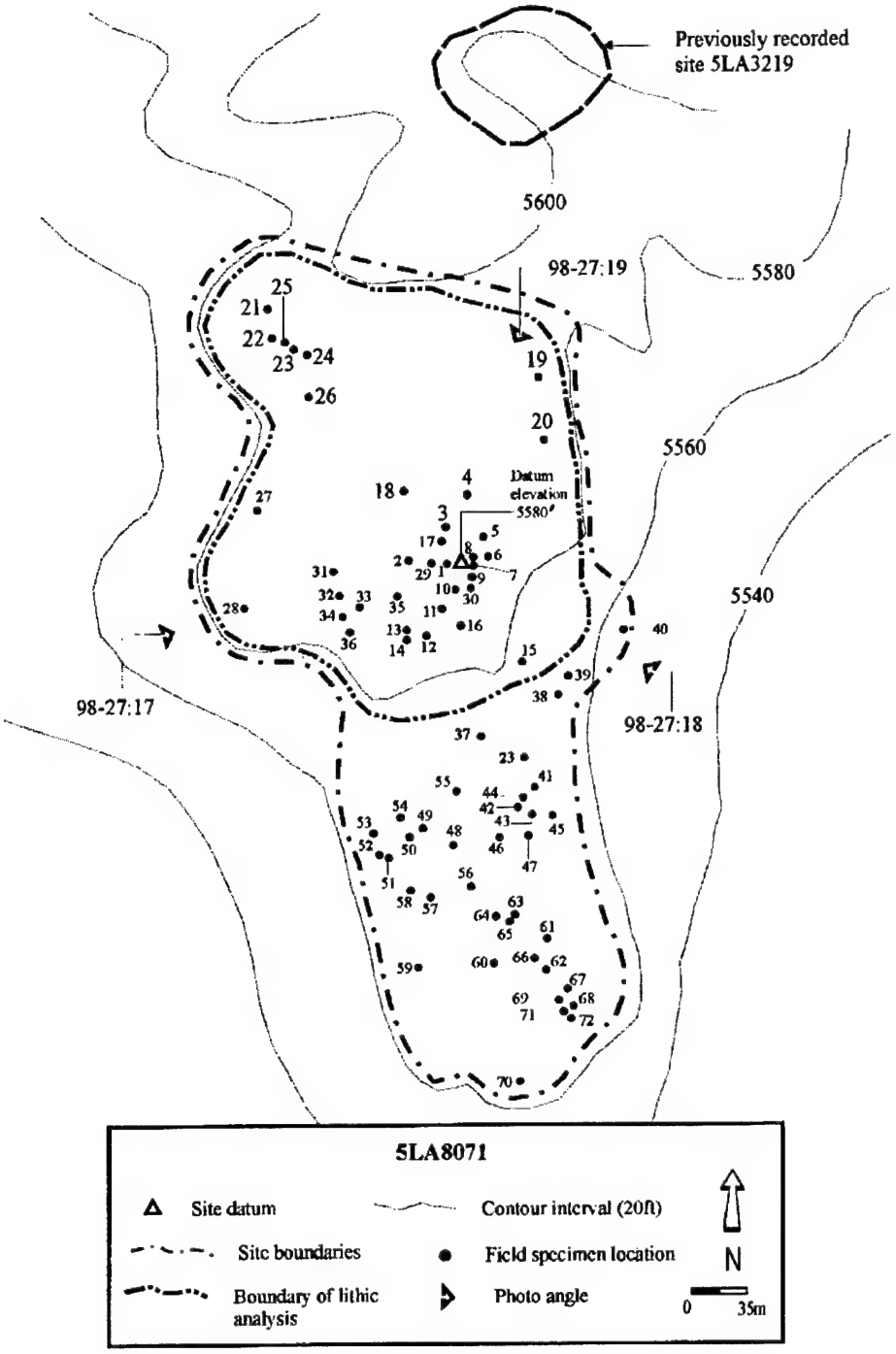


Figure 4.26: Site map, 5LA8071.

Figure 4.27: Photograph of site 5LA8071 (PCMS 98-27:18), taken from southeastern site boundary looking toward the datum.

Table 4.7: Summary Description of Chipped-Stone Debitage for 5LA8071.

	Argillite	Chalcedony	Chert	Quartzite	Hornfels/Basalt	Obsidian	Silicified Wood	Limestone
Total	16	1	16	30	72	7	8	4
Large	7	0	4	16	52	3	1	4
Small	9	1	12	14	20	4	7	0
Cortical	3	0	2	7	21	0	0	1
Noncortical	13	1	14	23	51	7	8	3
Complex	2	0	4	12	21	6	2	3
Shatter	0	0	1	2	8	0	3	0
Simple	14	1	11	16	43	1	3	1

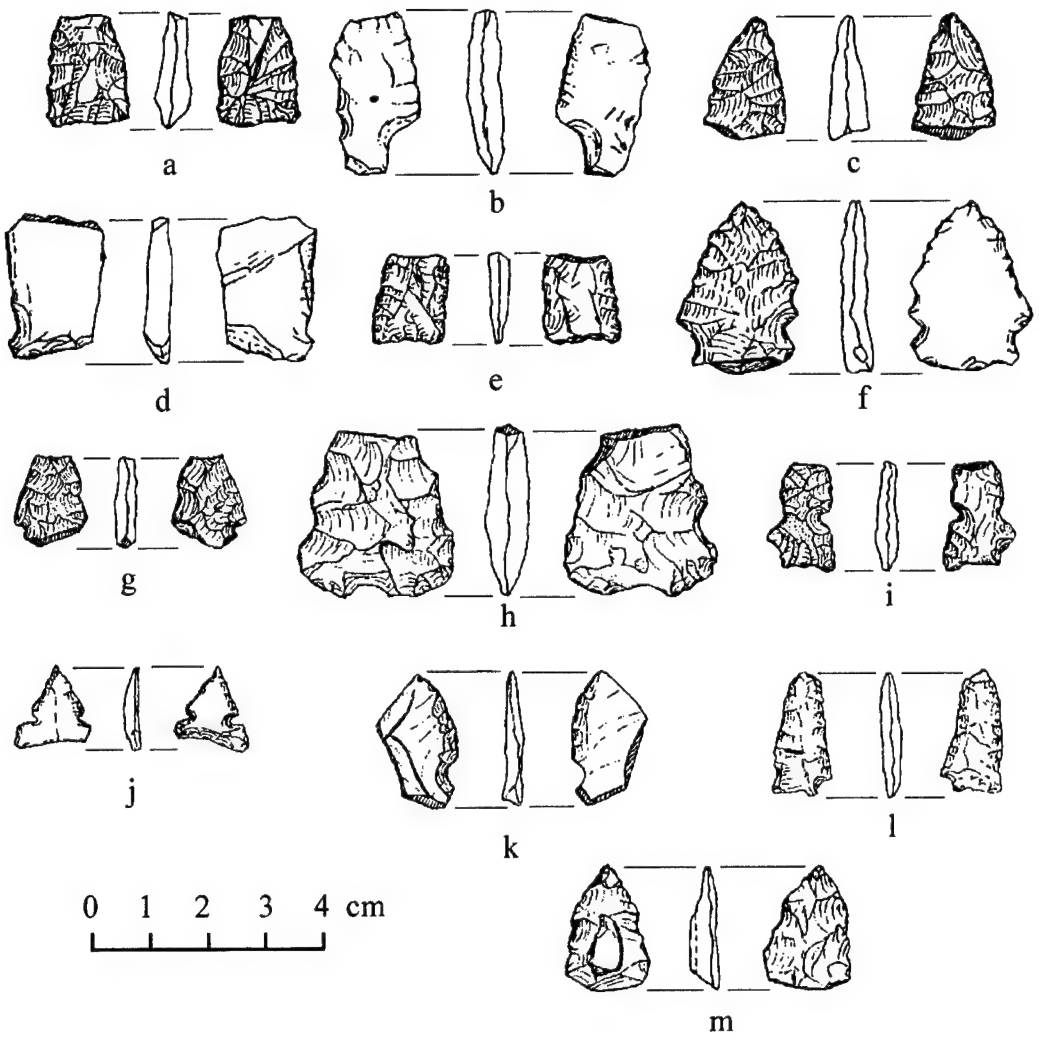


Figure 4.28: Projectile points recovered from the surface of 5LA8071: (a) 5LA8071.0.9; (b) 5LA8071.0.14; (c) 5LA8071.0.25; (d) 5LA8071.0.15; (e) 5LA8071.0.24; (f) 5LA8071.0.20; (g) 5LA8071.0.26; (h) 5LA8071.0.34; (i) 5LA8071.0.28; (j) 5LA8071.0.1; (k) 5LA8071.0.32; (l) 5LA8071.0.2; (m) 5LA8071.0.7.

Nine material types are noted on this large site. Of the total debitage, 47% is hornfels/basalt, 16% is fine-grained quartzite, 10% is argillite, 10% is chert, 5% is silicified wood, 5% is obsidian, 3% is coarse-grained quartzite, 3% is limestone, and 1% is chalcedony. These materials are 97% cryptocrystalline or microcrystalline, and 3% macrocrystalline materials with some degree of conchoidal fracture properties. Other than the obsidian items, all materials are locally available. Comparison with a known obsidian collection suggests that specimens from both the Polvadera Peak and Cerro del Medio sources in New Mexico are present.

All stages of core and cobble reduction are represented in the assemblage. Overall, 78% of the assemblage is noncortical, while 22% shows some dorsal cortex. These percentages are further broken down as 40% small noncortical flakes, 38% large noncortical flakes, 19% large cortical flakes, and 3% small cortical flakes. Based on the low percentage (23%) of small complex flakes and the lack of identifiable biface-thinning flakes, there appears to be little emphasis on making finished uniface and biface tools on site. At least portions of the debitage are related to early-stage biface manufacture. The shatter specimens and most of the large cortical flakes were being produced as a by-product of hornfels/basalt, silicified wood, quartzite, and chert core reduction. These material types are all represented in the core assemblage. Based on the rather large percentage of large cortical items in the quartzite and hornfels/basalt materials, we can infer that these items were being transported to the site in cobble or nodule form. No cortex is present for the obsidian or silicified wood categories, and these materials were likely brought to the site in the form of biface tools. The presence of limestone flakes suggests that some kind of expedient flake tool technology was in place, even though use wear is not present on these highly weathered artifacts. The high percentage (16%) of fine-grained quartzite stands out compared to other sites in the region. It is possible that cobbles of this material can be found on erosional terraces in the area.

The site yielded a total of 13 projectile points (Figure 4.28). Six points seem to suggest multiple occupations for the site ranging between the Middle Archaic period and the Protohistoric Period of the Late Prehistoric Stage (3000 BC to AD 1750). One projectile point (5LA8071.0.14) is classified as a P7 and fits dates assigned to Middle Archaic Stage (3000 BC to 1000 BC). The second oldest point (5LA8071.0.20) is similar to Anderson's P35 type, which has associated dates of between 1000 BC and AD 1200. The remaining four points (5LA8071.0.1, 5LA8071.0.24, 5LA8071.0.28, and 5LA8071.0.9) are all small, with dates ranging from AD 800 to AD 1750. Using the classificatory system developed by Zier and Kalasz (1999), these would fall into the Late Prehistoric Stage (AD 100 to AD 1725) and cover all three periods.

The remaining stone tools consist of 30 artifacts-- 11 non-bipolar cores, 6 scraping tools, 5 core-tools, 5 bifaces, 2 drills, and 1 utilized flake. Because the cores and core-tools were analyzed in the field, only the material type is recorded. Material types for the cores are hornfels/basalt (5), quartzite (2), argillite (1), chert (1), limestone (1), and silicified wood (1). The core-tools are hornfels/basalt (4) and argillite (1).

Of the bifaces, four of the five specimens are broken. Most are hornfels/basalt (3), with one each for obsidian and coarse-grained quartzite. Two bifaces are further classified as unfinished, two are nearly finished bifaces, and one is finished. One of these (FS 6) displays polish wear along one <45 degree lateral edge and was likely used as a knife.

The scraping tools are classified as three combination end/side scrapers, two side scrapers, and one end scraper. The end/side scrapers are complete, heavily used on three faces, and made of cryptocrystalline materials. One of the three material types is from nonlocal source (Alibates dolomite), and the two remaining specimens are chert and fine-grained quartzite. Both side scrapers are broken and made of chert; heavy modification retouch and use wear is seen on both

lateral edges. The end scraper is complete, made of chert, and shows heavy retouch along the steep distal end.

The remaining three artifacts include two drills and one utilized flake. The drills are classified as finished, with one broken and one complete specimen. The complete drill is fine-grained quartzite and was used in a clockwise motion. The broken drill is made of nonlocal Black Forest silicified wood, and the drilling orientation could not be determined. Moderate to heavy wear is present on both steep (>45 degree) edges of the basalt utilized flake.

Twenty-two pieces of ground stone were recorded at the site. Of these, ten are sandstone manos, six are granite manos, and six are sandstone metate fragments. These are further classified as one-hand manos (16), slab metates (5), and shallow basin metates (1). Only three of the manos are whole.

Interpretation and Summary

The site is subject to water and wind erosion, and Army maneuvers have impacted the site to some degree. Site 5LA8071 is a large lithic scatter with large amounts of ground- and chipped-stone tools. Even though soil depth is shallow over most of the site, some areas or pockets of greater deposition are present on the slopes to the east and below the limestone caprock. Test excavations in the basin area of the site could yield data for the reconstruction of subsistence patterns and/or paleoenvironment. Diagnostic artifacts, useful for addressing issues about chronology were located, and they indicate the possibility of recovering more in buried contexts. We suggest the site be revisited for more detailed mapping and surface collection. A variety of exotic raw materials (Alibates dolomite, Black Forest silicified wood, and Jemez Mountain obsidian) are present, and the site may yield trade and exchange data. We recommend that the site be considered for nomination to the National Register of Historic Places on the grounds that it is likely to yield information important to our understanding of prehistory.

5LA8090

The site is a sparse lithic scatter with the remains of structures. It sits on an alluvial fan that slopes in a southern orientation from the edge of the Big Arroyo Hills into Taylor Arroyo (Figures 4.29 and 4.30). The terrain is the lobed extension of a small flat-topped ridge. This area overlooks an unnamed drainage that eventually flows into Taylor Arroyo, approximately 640 m to the south. The site has been heavily impacted by military maneuvers and sheetwash erosion. This erosion has led to at least 40 cm of colluvial deposition in the site area. Small soapweed, needle and thread grass, sagebrush, prickly pear cactus, and foxtail barley were found growing on this 0.12-acre site. Outcropping beds of shale and limestone can be seen directly west of the site's western boundary.

Features

Three features are recorded at the site, and they are in close proximity to one another. Feature 1 is a limestone slab, circular structure, with at least two of the slabs placed upright.

This structure is the best preserved and measures 5.5 by 3.5 m (Figure 4.31). Because of heavy disturbance it is unknown exactly what Features 2 and 3 looked like. Feature 2 is a limestone cobble alignment that appears to be part of a roomblock. It measures approximately 4.7 m in length and 1.7 m in width (Figure 4.32). A distinct surface depression is noted just behind and to the north of this alignment. Feature 3 is a tabular sandstone slab alignment measuring 4 x 2.5 m. Some of the slabs appear to have been placed upright, but these could also have resulted from tracked vehicle disturbance (Figure 4.33). Because these features have been so highly disturbed, they cannot be assigned to any of Kalasz's (1989) structure classes.

Lithic Artifacts

Because this site has been highly impacted by water erosion, very little debitage remains. The debitage assemblage consists of four flakes, of which two are small noncortical argillite flakes, one is a small cortical argillite flake, and one is a large cortical basalt flake. Based on the presence of cortex, both materials appear to have been brought to the site in nodule form. No specific site activity can be inferred from this small assemblage.

Two heavily used manos were recovered from between Features 1 and 2 and at the edge of the shallow depression. The first specimen (FS 1) is complete and made of sandstone. This one-hand mano measures 12.5 x 9.5 cm and exhibits grinding and battering on both faces. A red color change is evident from heat exposure. The second specimen (FS 2) is whole and displays three ground and battered facets on two faces. It measures 11.5 x 8 cm with no visible heat exposure.

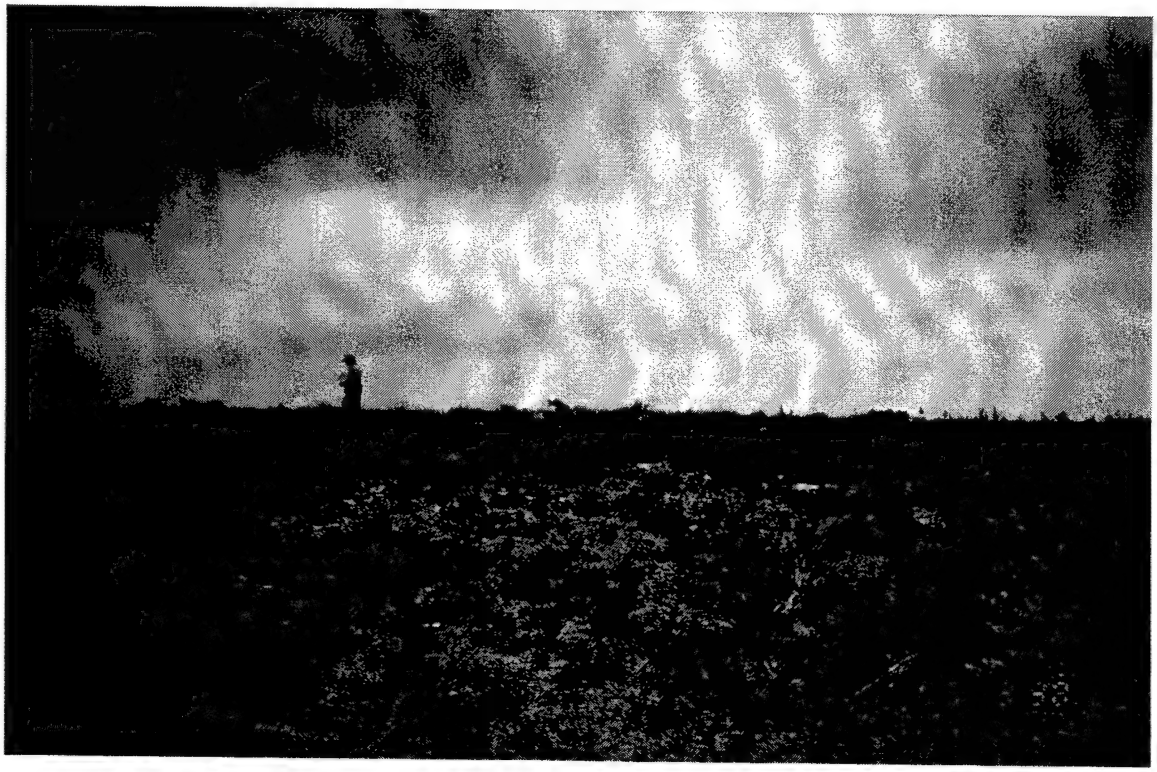


Figure 4.29: Photograph of site 5LA8090.

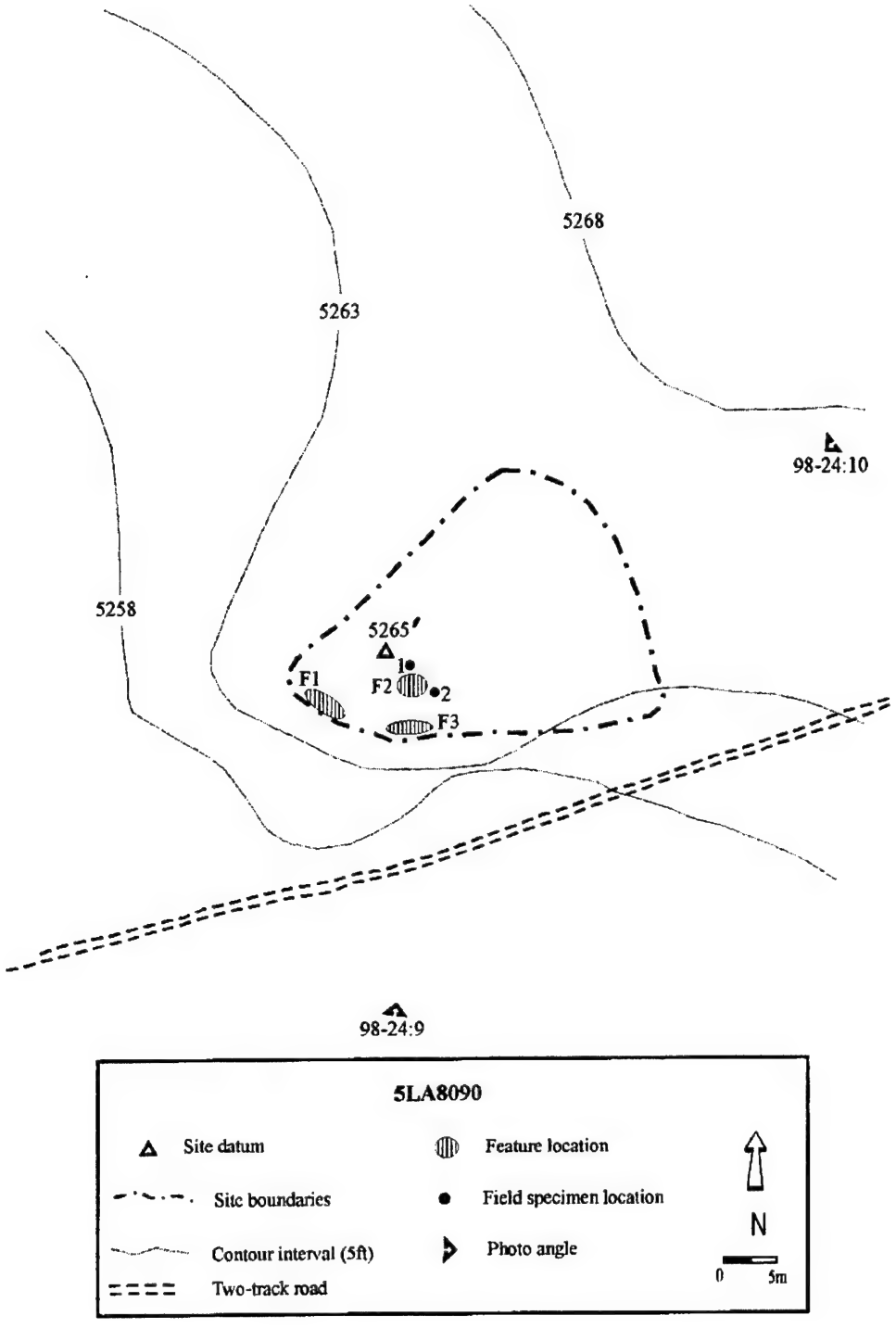


Figure 4.30: Site map, 5LA8090.

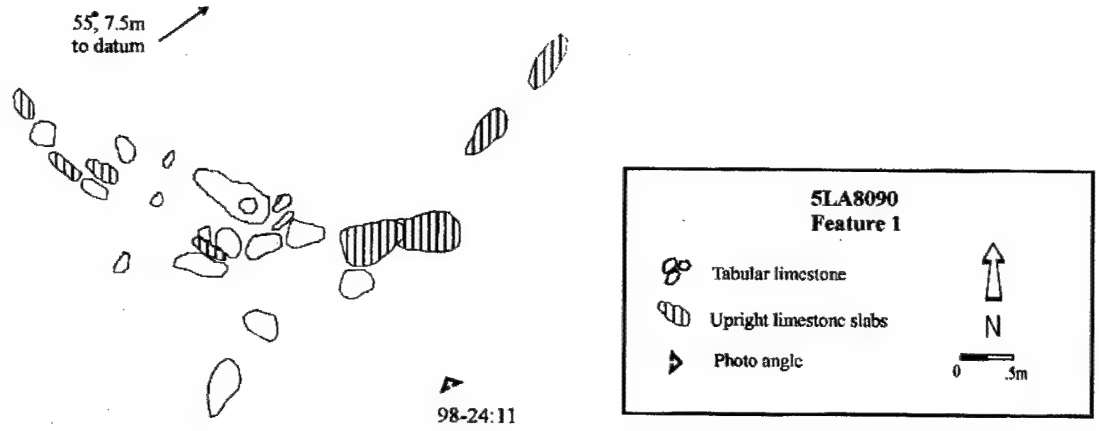


Figure 4.31: Feature 1 planview, 5LA8090.

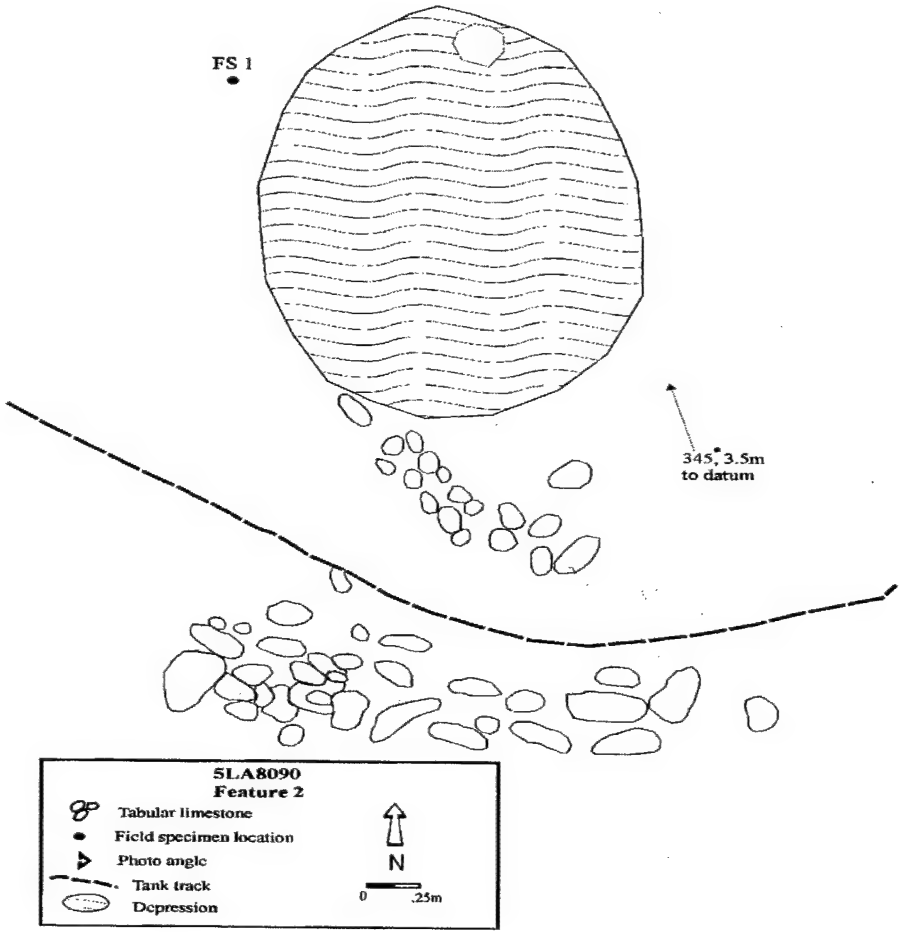


Figure 4.32: Feature 2 planview, 5LA8090.

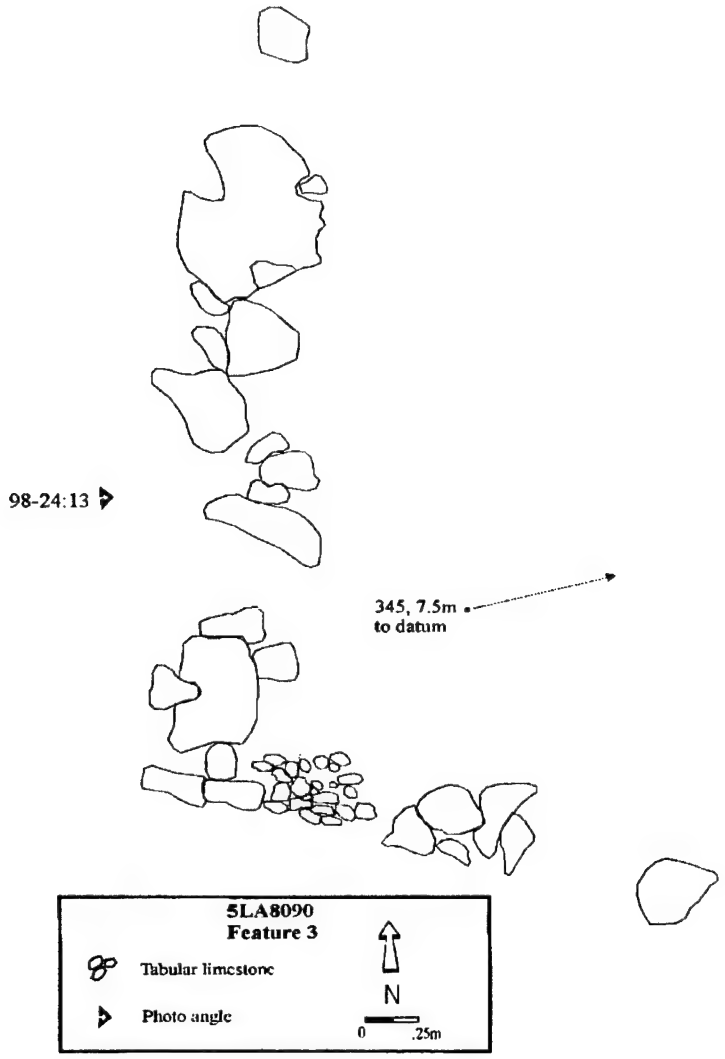


Figure 4.33: Feature 3 planview, 5LA8090.

Interpretation and Summary

Most of the structure sites in the PCMS are found in sheltered areas or locations within juniper tree cover. Site 5LA8090 is unique in the fact that it is located on an open alluvial fan with no tree cover whatsoever. Feature 1 and the depression associated with Feature 2 appear to have soil deposition, and buried cultural deposits could exist. The mano and debitage specimens indicate that the primary site activities are raw material reduction and food processing. The site surface and Features 2 and 3 have been nearly destroyed by mechanized vehicle traffic. All three features should be tested to determine the original function and fenced to protect what little remains. Testing data recovered from these three structures could aid in addressing settlement issue questions for populations in the PCMS. We recommend this site be determined eligible for the National Register.

5LA8091

The site is a sparse scatter of lithic debitage with a heavy concentration of ground-stone artifacts located around, and eroding out of, a roasting pit/hearth (Figures 4.34 and 4.35). The site is located in the highly eroded floodplain of Taylor Arroyo approximately 5.3 km northeast of Rock Crossing. The site surface is a silty clay hardpan with sparse vegetation scattered randomly throughout. Large saltbush plants dominate the vegetation, and these anchor the remaining pockets of cultural deposition (<10 cm). Other plant species noted at the surface include foxtail barley, galleta grass, snakeweed, scarlet globe mallow, goldenrod, sunflower, western wheat grass, and prickly pear.

Features

The roasting pit/hearth remnant (Feature 1) has vegetation growing from it, enabling the feature to remain partially intact. Pieces of thermally altered limestone and sandstone cobbles, ash, and broken ground-stone artifacts are weathering out of this feature, which measures 2.5 x 1.8 m. At least 25 cm of fill is present above the modern hardpan surface.

Lithic Artifacts

All of the debitage specimens are from deflated contexts and were found on the hardpan surface. The debitage consists of 20 simple flakes, 11 complex flakes, 4 pieces of angular shatter, and 3 biface-thinning flakes. The material data for the debitage is presented in Table 4.8. The material types are 40% hornfels/basalt, 26% chert, 21% argillite, 11% coarse-grained quartzite, and 3% obsidian. The presence of cortex on 26 percent of the specimens indicates that most of the materials were collected at the source, with only a small amount brought to the site in cobble or nodule form. The obsidian specimen is apparently from the Jemez Mountain source area and is a biface-thinning flake with no dorsal cortex. This suggests that nonlocal lithic materials were brought onto the site as formal tools, and the procurement tactic likely involved seasonal movement or exchange.

Unlike many sites in the area, most of the flakes (68%) were small. The percentage of small noncortical flakes (58%) shows that both early- to late-stage biface reduction, and late-stage raw material reduction was responsible for the debitage recorded on the site. In addition, three material types represent biface-thinning flakes; so at least that many bifaces were manufactured or reworked on site.

The stone tool assemblage consists of nine artifacts; of which six are non-bipolar cores, two are projectile point fragments, and one is a drill bit fragment. Material types for the cores are basalt (5) and argillite (1). The drill bit fragment (FS 23) is classified as finished and made of argillite. Retouch modification is present on both edges and indicates that this tool was rotated in a clockwise manner. Both of the projectile points are less than 50% complete and made of chert (Figure 4.36). The first point (5LA8091.0.2) is a small basal fragment that could not be placed within the Anderson (1989) system. The second specimen (5LA8091.0.4) is similar to a P52 type and is associated with dates between AD 800 and AD 1350. This artifact indicates this site was occupied during the Developmental Period of the Late Prehistoric Stage.

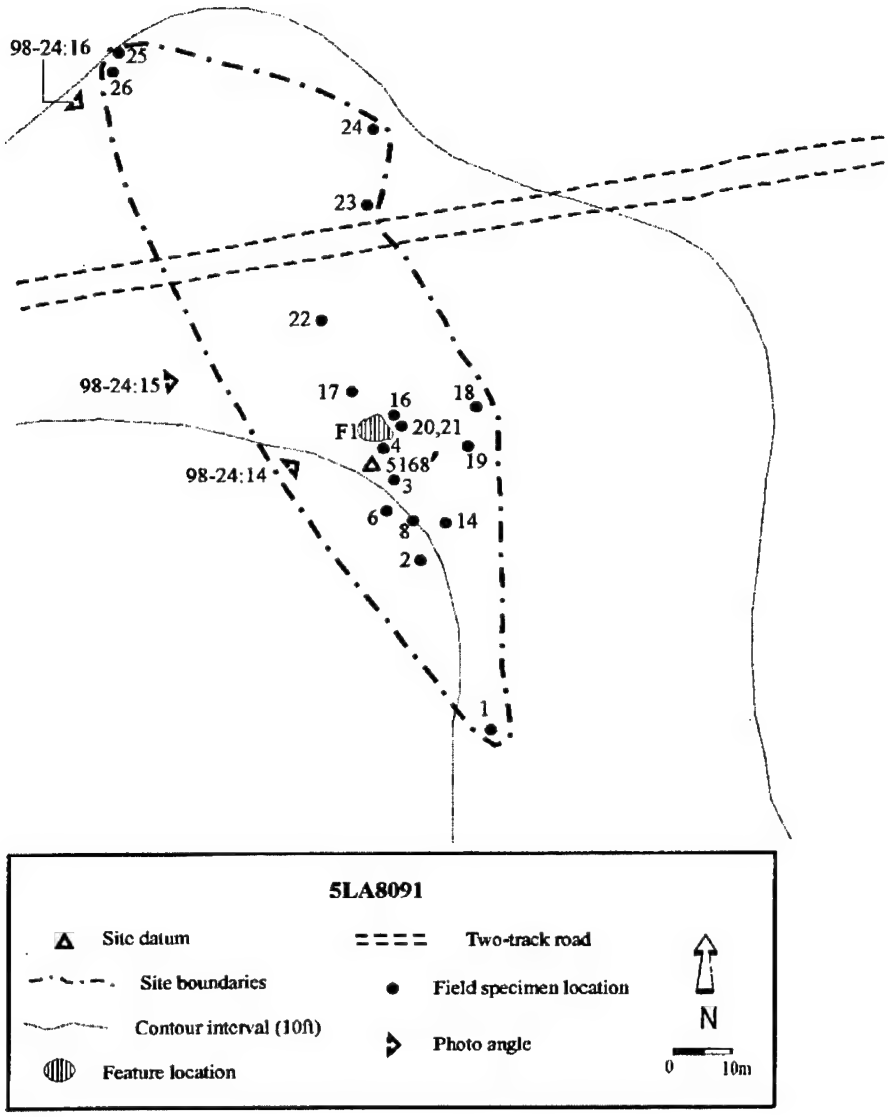


Figure 4.34: Site map, 5LA8091.

Figure 4.35: Photograph of site 5LA8091.

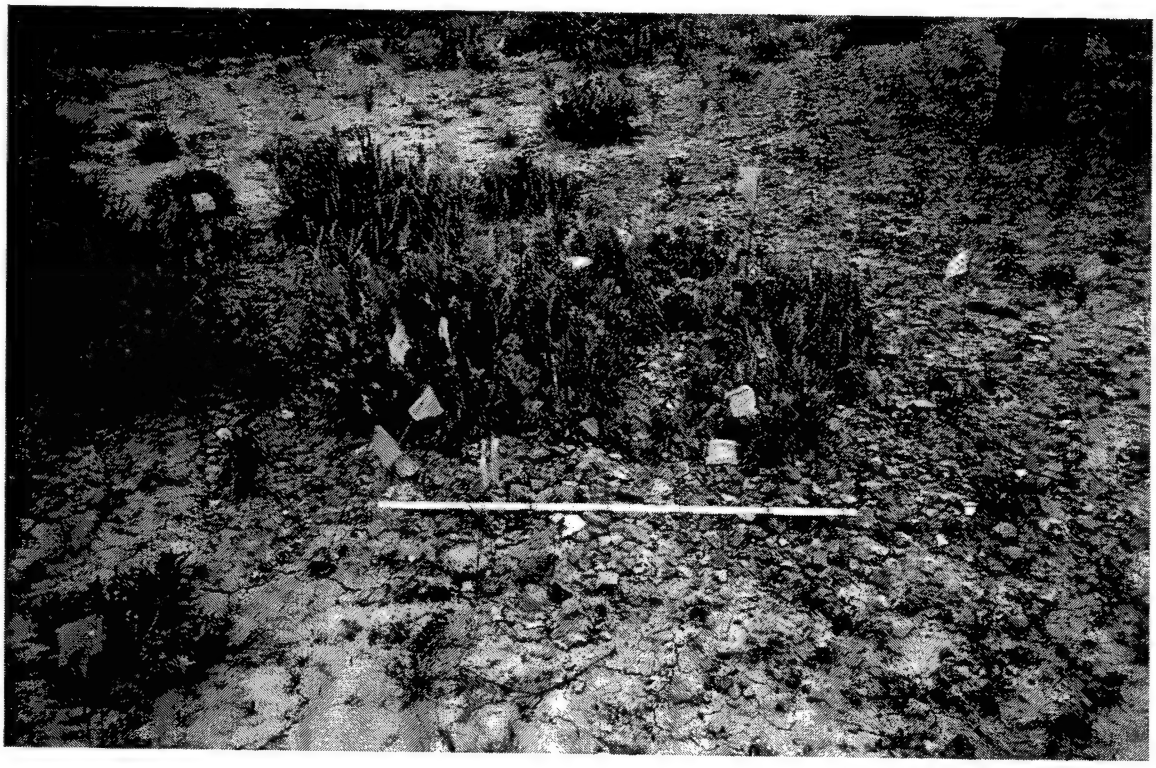


Figure 4.36: Photograph of Feature 1, a hearth, 5LA8091. Photo taken facing northeast.

Table 4.8: Summary Description of Chipped-Stone Debitage for 5LA8091.

	Argillite	Chert	Hornfels/Basalt	Obsidian	Quartzite
Total	8	10	15	1	4
Large	5	0	7	0	0
Small	3	10	8	1	4
Cortical	5	1	4	0	0
Noncortical	3	9	11	1	4
Complex	0	5	3	0	3
Shatter	3	0	1	0	0
Simple	5	4	10	0	1
Biface-Thinning	0	1	1	1	0

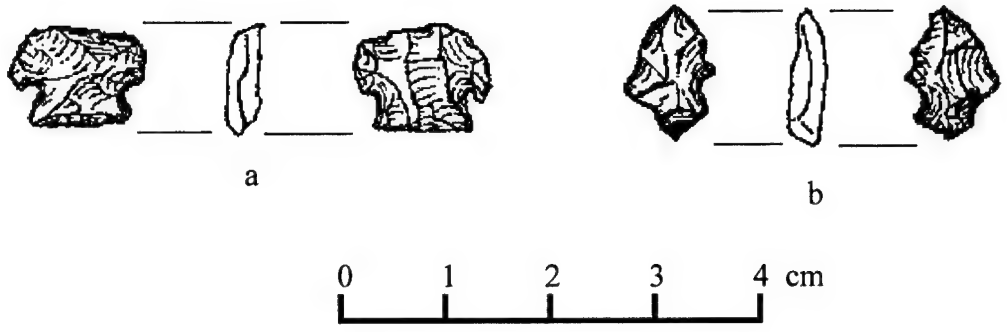


Figure 4.37: Projectile points from the surface of 5LA8091: (a) 5LA8091.0.4; (b) 5LA8091.0.2.

A total of 16 ground-stone artifacts were analyzed on the site. All were broken. They were divided into the following classes -- slab metates (7), manos (6), edge-ground cobbles (2), and basin metate (1). The slab metate fragments are all made of locally available sandstone. The manos are basalt (4) and sandstone (2); the edge ground cobbles are diorite and sandstone. The basin metate, the most complete ground-stone artifact recorded on the site, is made of sandstone. Eleven of these artifacts were found in the immediate vicinity or eroding out of Feature 1. This includes all of the mano fragments and five of the metate fragments. Normally all of the edge-ground cobbles are collected; on this site, however, this was not done because both were very small edge fragments with little information to gain.

Interpretation and Summary

Even though this site is small and lacks deposition over much of its area, Feature 1 has approximately 25 cm of intact cultural deposits. This feature also has eleven pieces of ground stone eroding from it. It seems highly probable that a test unit would mitigate the site and yield information relevant to the research domains of subsistence and/or paleoenvironment. Also, the presence of obsidian is relevant for addressing research on trade and exchange.

5LA8092

Site 5LA8092 is located in the Taylor Arroyo floodplain and sits 100 m east of the arroyo proper. Most of the artifacts are located on a small rise that dips gently (less than 1 degree) to the south and terminates at a small, unnamed arroyo (Figures 4.38 and 4.39). The north side of this rise dips steeply (3 degrees) with a large wind-eroded area near the northern site boundary. Most of the artifacts and numerous pieces of fire-cracked rock are eroding out of the blowout sidewall. The soils on the rise are sandy in nature and contrast sharply with the silty hardpan soils found around the site perimeter. These sandy soils support sparse patches of galleta and squirreltail grass, saltbush, cholla, yucca, and sunflower. Site 5LA8091 (lithic scatter with hearth) is located 120 m northeast and Rock Crossing is 5.2 km down the arroyo.

Lithic Artifacts

Twenty-eight debitage specimens were recorded at the surface. Debitage categories present in the assemblage are 15 simple flakes, 9 complex flakes, 3 biface-thinning flakes, and 1 piece of angular shatter. Table 4.9 presents the chipped-stone debitage data. Five material types were recorded in this sparse lithic scatter. Of the total debitage, 36% is argillite, 29% is hornfels/basalt, 18% is chert, 11% is quartzite, and 7% is silicified wood. These materials are all cryptocrystalline or microcrystalline. The high percentage of chert stands out compared to other sites in Training Area 7 and a gravel source may be present nearby. Other than the silicified wood, all materials are locally available. The origin for the silicified wood is unknown; however, it compares visually to specimens identified as originating from the Palmer Divide area of south central Colorado (Black Forest silicified wood).

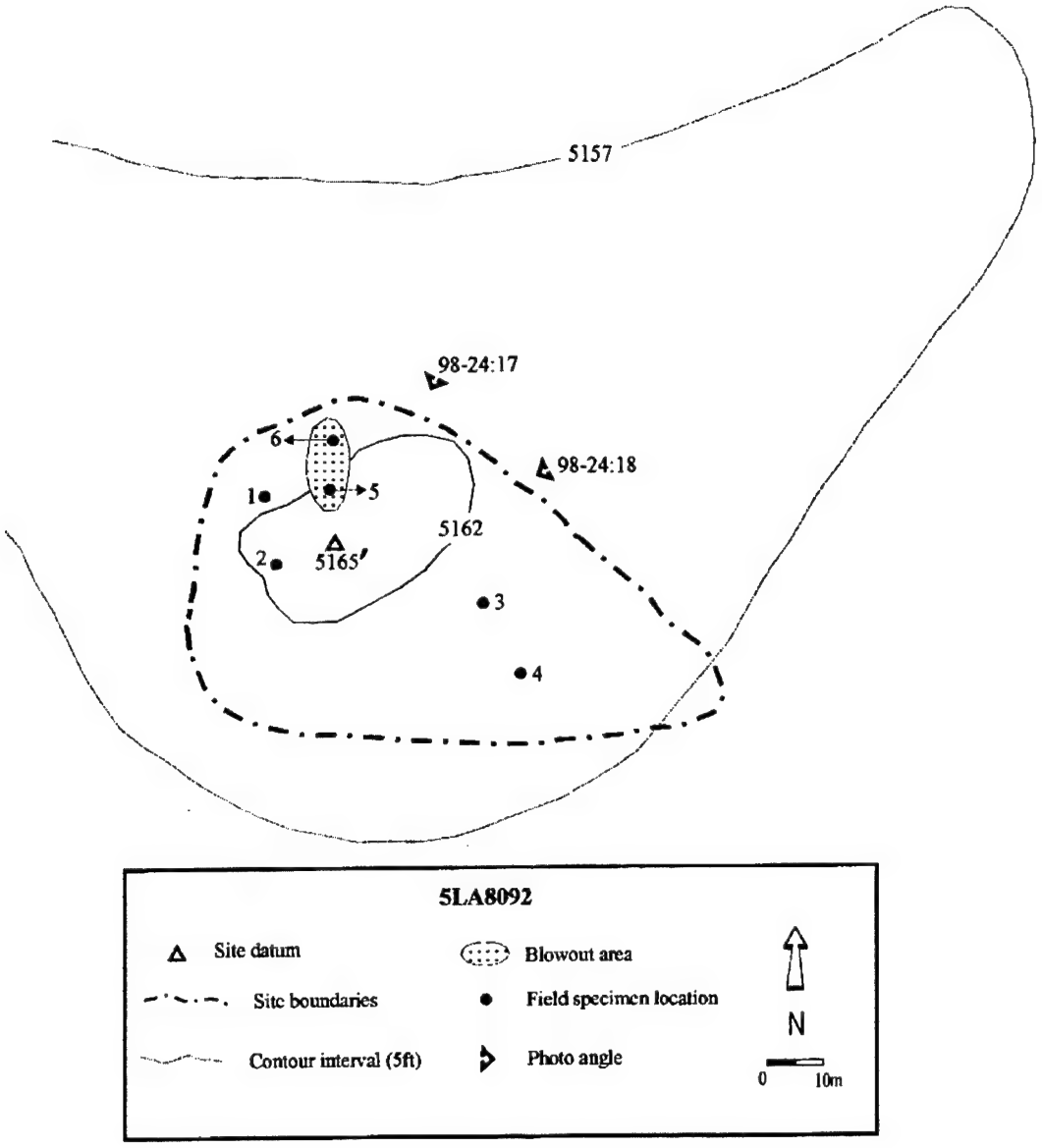


Figure 4.38: Site map, 5LA8092.

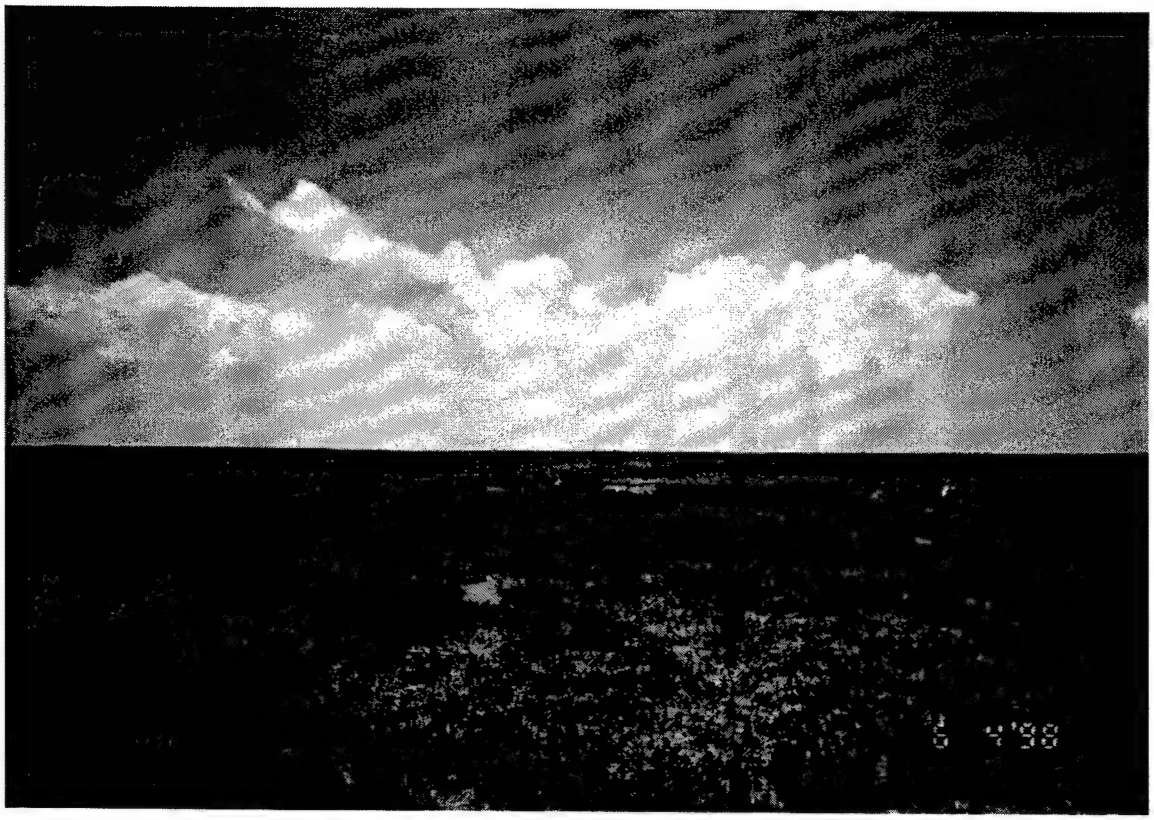


Figure 4.39: Photograph of site 5LA8092; taken facing southwest (230 degrees).

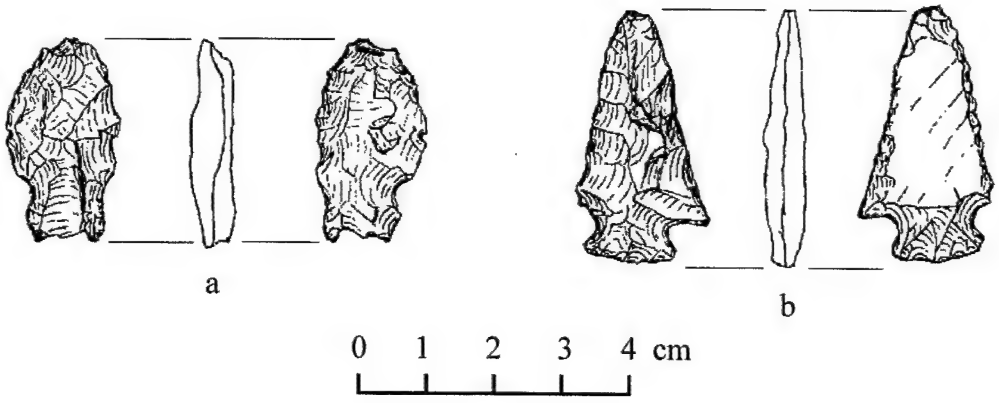


Figure 4.40: Projectile points recovered from site 5LA8092: (a) 5LA8092.0.1; (b) 5LA8092.0.2.

Table 4.9: Summary Description of Chipped-Stone Debitage for 5LA8092.

	Argillite	Chert	Hornfels/Basalt	Quartzite	Silicified Wood
Total	10	5	8	3	2
Large	4	3	3	1	1
Small	6	2	5	2	1
Cortical	4	1	2	1	0
Noncortical	6	4	6	2	2
Complex	4	3	2	0	0
Shatter	0	0	0	1	0
Simple	6	2	6	1	0
Biface-Thinning	0	0	0	1	2

Of the debitage specimens, 71% are noncortical and 29% have cortex. Sixteen specimens fall into the small size grade, and 12 were recorded as large. The presence of cortex indicates locally available cobble or nodule resources were being modified and used. The high percentage of small noncortical (46%) flakes and presence of biface-thinning flakes indicates that all stages of biface manufacture were performed on site. The angular piece of quartzite shatter was likely the result of cobble reduction.

The tool assemblage consists of six artifacts. Two are manos (one sandstone, one diorite), two are projectile points (Figure 4.40), one is a quartzite non-bipolar core, and one is a large battered quartzite core-tool. The first projectile point (5LA8092.0.2) is made of argillite and resembles Anderson's (1989) P42 type. It has a temporal range of between AD 600 and AD 1600. The second point (5LA8092.0.1) is made of Black Forest silicified wood. Though this point is complete, it did not fit well with any of Anderson's point types.

Interpretation and Summary

The site is eligible for National Register nomination. Sites 5LA8092 and 5LA8091 are the only sites we found along the Taylor Arroyo floodplain with diagnostic projectile points and areas of cultural deposition. While no features were recorded, the presence of thermally altered rocks in eroded areas suggests a good chance of locating intact subsurface cultural deposits there. Diagnostic projectile points were recovered from the surface, and if more were found in buried contexts they would aid in refining the regional chronology. The presence of nonlocal silicified wood indicates that the site may yield data pertinent to the reconstruction of trade and exchange networks. Because the site is located in a high military impact area, it should be fenced for its protection. The areas directly east and south of the eroded area should be test excavated. If cultural deposits are not found, then the fence can be removed.

5LA8104

The site is a large lithic scatter and feature complex located on a grassy plain between two small unnamed drainages (Figures 4.41 and 4.42). The 4.8-acre site extends along the top of a long ridge that slopes gradually to the south. Areas of sandstone bedrock are exposed on the eastern edge of this ridge. Considerable sheetwash erosion has disturbed the site area, leaving gravelly to silty soils. Soil depths vary across the site, but in some areas up to 50 cm was observed. The site is located in a transitional zone between open prairie and a juniper forest with intermittent piñon pine trees. A wide variety of vegetation was observed, including cholla, soapweed, prickly pear, wheatgrass, foxtail barley, needle and thread grass, squirreltail grass, sagebrush, and sunflowers. A large southwest to northeast trending ridge is present 900 m west of the site. It offers good visibility in all directions. Prehistoric structures, thermal features, and an extensive lithic scatter with several areas of dense artifact concentration were found on the site. This area of the PCMS has been heavily impacted by U.S. Army maneuvers, with vehicle tracks and trash noted on the site.

Features

Four features were recorded at the site. One (Feature 1) is a circular structure (tipi ring) located 36 m northeast of the site datum. It is constructed of discontinuous sandstone boulders in a circular alignment that measures approximately 7 x 5.5 m (Figure 4.44). Of particular note is the observation that in many places multiple stones were used to secure the cover material. No door gap is visible, and interior features are either deeply bedded or nonexistent.

Features 2 and 3 are thermal features. Feature 2 is an ash stain measuring approximately 6 x 8 m. Soils and artifacts within this feature are eroding out and indicate some soil deposition. A large pack rat nest impacts this feature at the base of a large juniper tree. Feature 3 is a deflated hearth composed of several burned sandstone cobbles. It is possible that part of the hearth is still intact, but how much is unknown. This feature measures 2.1 x 1.8 m. The last feature (Feature 4) is a dense concentration of lithic artifacts measuring approximately 10 x 10 m. It is located 40 m at 5 degrees from the site datum.

Lithic Artifacts

Table 4.10 presents a summary of the chipped-stone debitage recorded at the site. Two hundred and one specimens were recorded-- 151 general site artifacts and 50 artifacts recovered from the area of Feature 4 (lithic concentration). Nine material types were noted. Of the total debitage, the overwhelming majority is argillite (84%) and basalt (11%). The remaining five percent of the materials are chert, fine-grained quartzite, chalcedony, obsidian, coarse-grained quartzite, silicified wood, and limestone. Other than the obsidian flake, all materials are locally available. Visual examination reveals the obsidian type is Cerro del Medio.

The debitage consisted of 99 simple flakes, 89 complex flakes, and 13 pieces of shatter. The assemblage mainly consists of small cortical debitage (60%). Cortex was present on 77 (38%) of the complex flakes, 74 (37%) of the simple flakes, and 8 (4%) of the shatter specimens. Overall, 69% of the debitage was classified as small, and 31% is large. With cortex present on 59% of

the small flakes and 19% of the large flakes, it appears that the site functioned chiefly as a raw material reduction and early-stage biface manufacture location, with most of the material types collected in nodule or cobble form. The presence of several utilized or retouched flakes on site, coupled with the emphasis on core reduction, suggests that some kind of expedient flake tool technology might have been in use. The low percentage (9%) of small noncortical flakes and lack of biface-thinning flakes shows that very little late-stage biface reduction or resharpening occurred.

The Feature 4 assemblage was 25 complex flakes, 22 simple flakes, and 3 pieces of shatter. Recorded materials include argillite (90%), hornfels/basalt (4%), chert (2%), fine-grained quartzite (2%), and silicified wood (2%). Like the overall assemblage, exploitation of locally available materials is evident. In this concentration, 74% were small cortical items, 12% were small noncortical items, 8% were large cortical items, and 6% were large noncortical items. These debitage types indicate that two major reduction activities took place in and around Feature 4, including core reduction and early- to middle-stage biface manufacture.

Two projectile points were recovered from the site surface; however, only one is diagnostic according to Anderson's (1989) classification (Figure 4.45). The first (5LA8104.0.12) is nearly 90 percent complete and made of silicified wood. The second projectile point (5LA8104.0.21) is made of argillite and conforms to Anderson's P48 type, which has associated dates between AD 500 and AD 1400. This artifact suggests a Late Prehistoric Stage occupation.

The chipped-stone tool assemblage consists of 16 artifacts, of which 5 are non-bipolar cores, 5 are bifaces, 5 are retouched or utilized flakes, and 1 is an end scraper. Material types noted for the cores are argillite (3) and basalt (2). Of the bifaces, three of the five specimens are broken; the material types are argillite (3) and fine-grained quartzite (2). These have been further classified as three unfinished and two nearly finished bifaces. Only one of the tool specimens exhibits use wear. This biface (FS 32) was used as an expedient scraping tool with light wear on the steep right lateral edge.

Within the retouched and utilized flake category, four specimens are broken, the other is complete. These are made of basalt (2), coarse-grained quartzite (1), argillite (1), and chert (1). Three display a single, unidirectionally retouched edge with an angle of greater than 45 degrees. Of the two remaining flake tools, one is bidirectionally retouched with an edge angle of less than 45 degrees, and the other shows both unidirectional and bidirectional retouch on separate lateral edges.

The end scraper is argillite and exhibits unidirectional retouch and heavy use wear along the distal end. No evidence for adhesions exists on the proximal end.

Three one-hand mano fragments, two whole one–hand manos, and two small slab metate fragments were recorded in the ground-stone assemblage. Three of the manos and both metate fragments are sandstone. The other two manos are coarse-grained quartzite and granite.

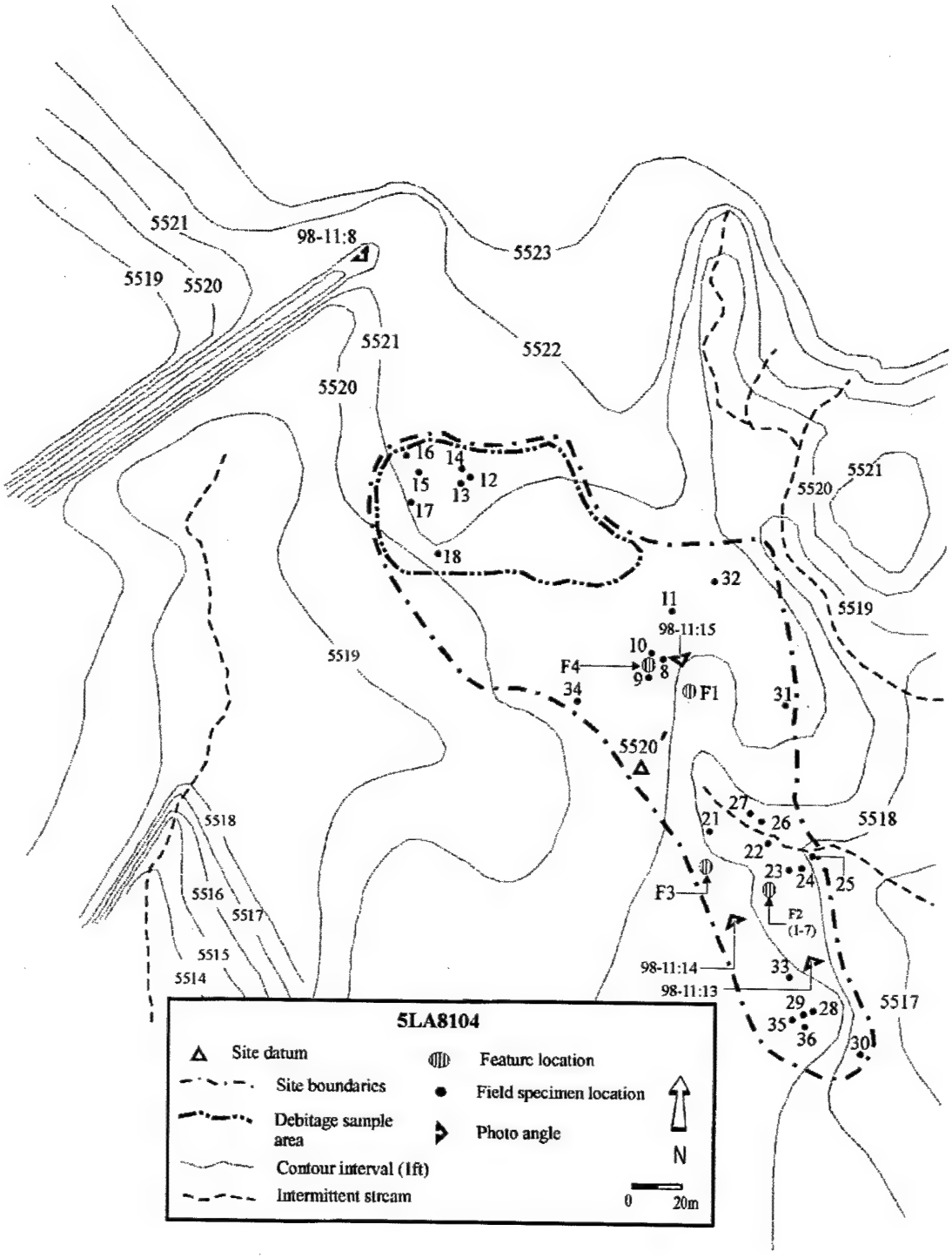


Figure 4.41: Site map, 5LA8104.

Figure 4.42: Overview photograph from site 5LA8104. Taken near Feature 2; tape shown in middle portion of feature.

Figure 4.43: Ceramic artifacts recovered from 5LA8104.

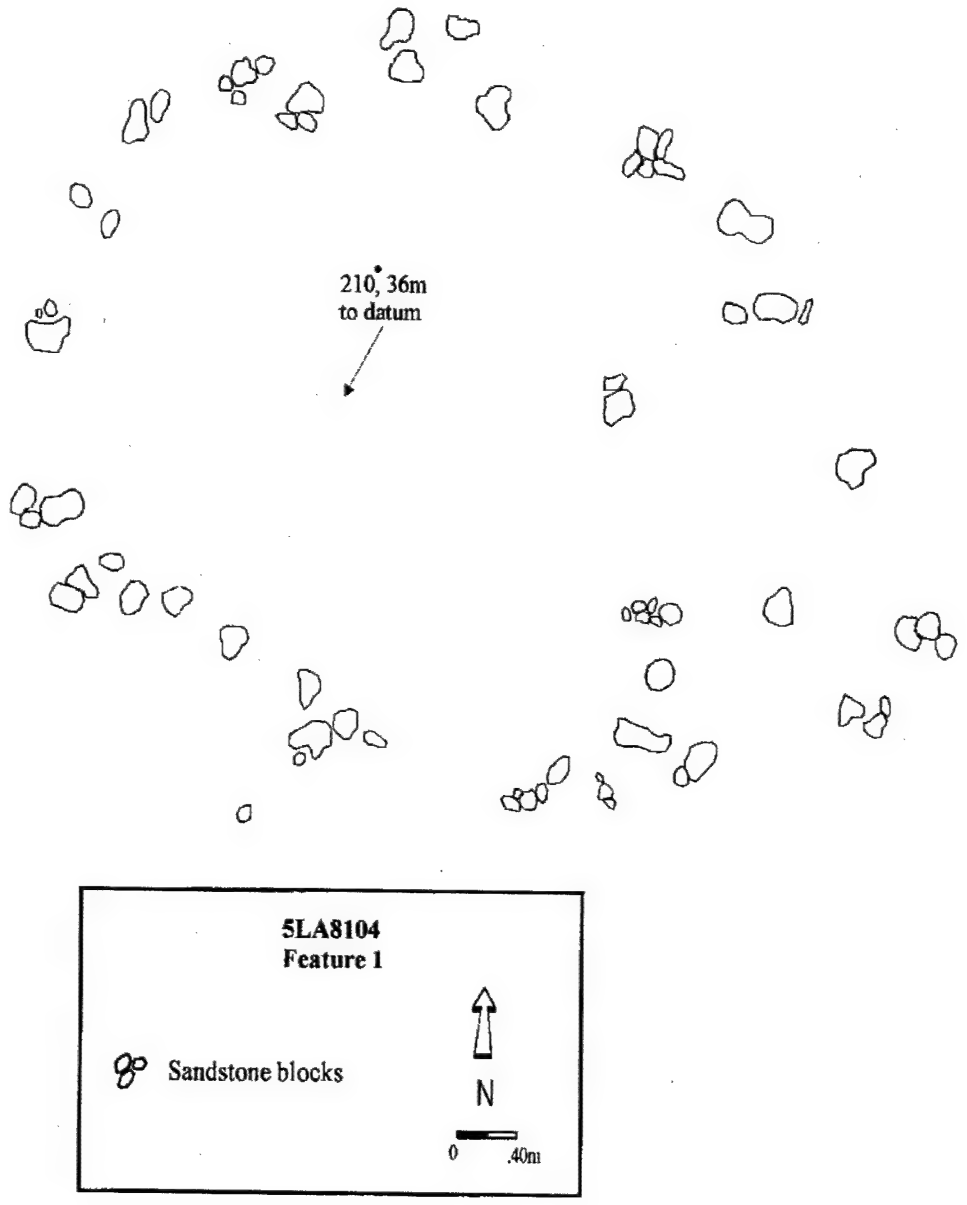


Figure 4.44: Feature 1 planview, 5LA8104.

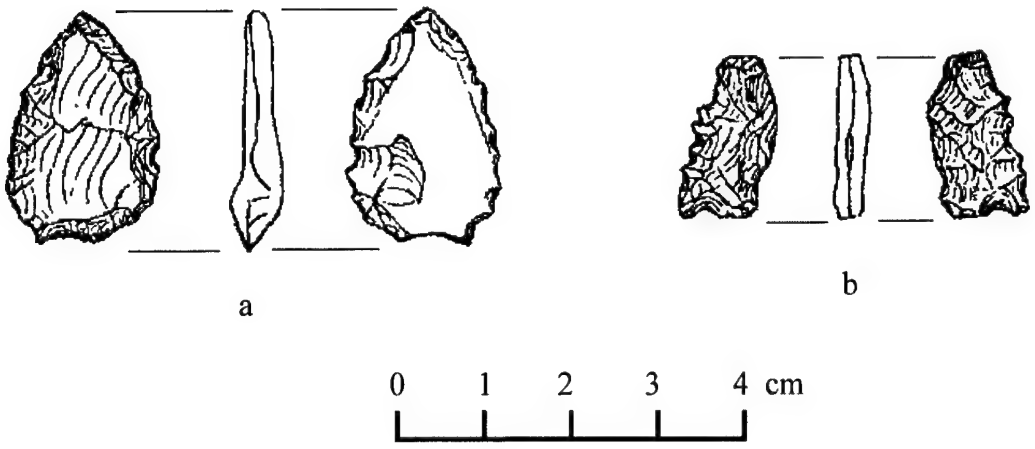


Figure 4.45: Projectile points from 5LA8104: (a) 5LA8104.0.21; (b) 5LA8104.0.12.

Table 4.10: Summary Description of Chipped-Stone Debitage for 5LA8104.

	Argillite	Chalcedony	Chert	Quartzite	Hornfels/Basalt	Obsidian	Silicified Wood	Limestone
Total	168	1	3	4	22	1	1	1
Large	39	1	0	2	19	0	1	0
Small	129	0	3	2	3	1	0	1
Cortical	139	1	3	4	10	0	1	1
Noncortical	29	0	0	0	12	1	0	0
Complex	73	1	2	3	9	0	1	0
Shatter	10	0	1	0	2	0	0	0
Simple	85	0	0	1	11	1	0	1

Ceramic Artifacts

Several ceramic sherds (7) were located in and near Feature 2 (Figure 4.43). These cord-roughened specimens are from a single vessel and are four body fragments, two handle fragments, and one neck fragment. See Appendix I for more detailed ceramic analysis and description.

Interpretation and Summary

The site should be fenced for its protection against military activities. This site is a fairly large lithic scatter and structure site with approximately 50 cm of soil deposition. Two possible thermal features (Features 2 and 3) indicate that there is a good probability of recovering intact,

buried, cultural deposits. Such deposits may yield pollen, faunal, and macrobotanical evidence useful for constructing subsistence and/or for reconstructing the paleoenvironment. The presence of obsidian is indicative of the site potential for addressing issues regarding trade and exchange. The ceramics and the possible datable carbon from the thermal features are useful for addressing chronological issues. Finally, the presence of structures is useful for research about settlement systems. We recommend that this site be determined eligible for the National Register on the grounds that it is likely to yield information important to our understanding of prehistory (Criterion D).

5LA8222

This site is located along the top of a small knoll and is surrounded by erosional drainages (Figures 4.46 and 4.47). It covers only 2.4 acres and has a high density of tools as compared to other sites in the Training Area 7 region. The site datum sits at 5,440 ft asl. Sparse grassland is the vegetative community dominating both the site and surrounding area. Plant species noted at the surface include soapweed, sunflower, juniper, barrel cactus, rabbitbrush, cholla, prickly pear, foxtail barley, galleta grass, needle and thread grass, and saltbush. The site is located in an active dune area, and eolian deposition is considerable. Depths of up to 50 cm were noted in the dune faces. A total of 88 artifacts were recorded at the surface, including 61 pieces of debitage, 13 flaked tools, 8 ceramic sherds, 3 pieces of burned bone, and 2 pieces of ground stone.

Features

Feature 1 is a concentration of thermally altered rocks. This loosely formed pile measures 1.4 x 1.2 m and is composed of unmodified tabular sandstone blocks. No artifacts or ash-stained soils were noted among the rocks. This feature is located 9 m southeast of the datum at a bearing of 115 degrees.

Lithic Artifacts

Sixty-one debitage items were recorded and found to be made from six specific material types. Table 4.11 shows there is a strong selection preference for hornfels/basalt (assuming that all materials were equally available and useful). The debitage is 57% hornfels/basalt, 20% coarse-grained quartzite, 10% argillite, 8% chert, 3% fine-grained quartzite, and 2% silicified wood. Nearly all of these material types are available in the region. Only one piece of debitage is made of nonlocal material (not available within the PCMS). Based on visual inspection, this item is made of Black Forest silicified wood, which is known to outcrop in the Palmer Divide area of Colorado. The lithic materials can be further reduced to the following: 70% microcrystalline, 20% macrocrystalline, 10% cryptocrystalline. Nearly half (49%) of the debitage samples were simple flakes. Complex flakes (40%), biface-thinning flakes (8%), and shatter (3%) make up the remainder.

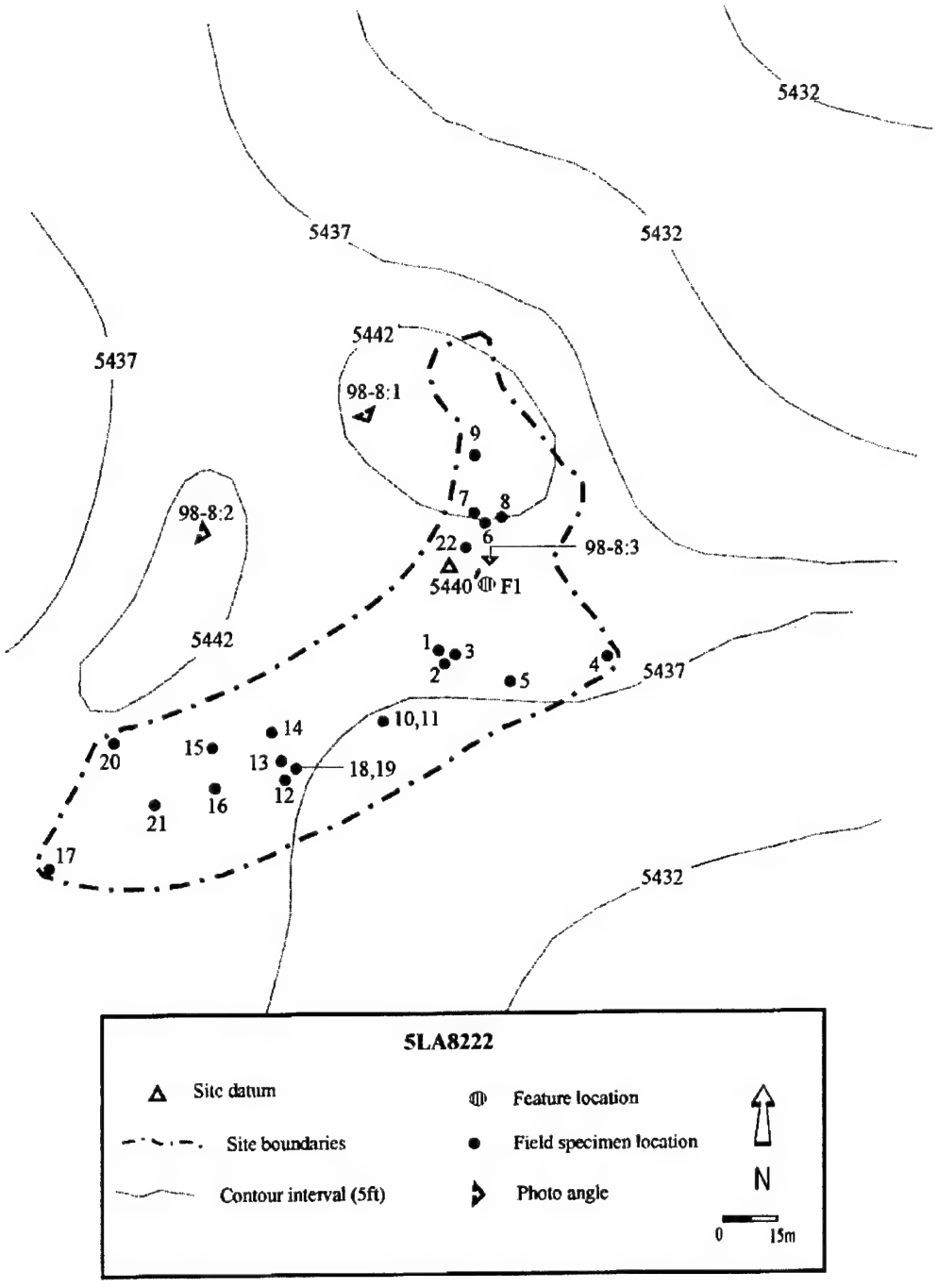


Figure 4.46: Site map, 5LA8222.

Figure 4.47: Overview photograph from site 5LA8222. Taken facing southeast (130 degrees) toward datum.

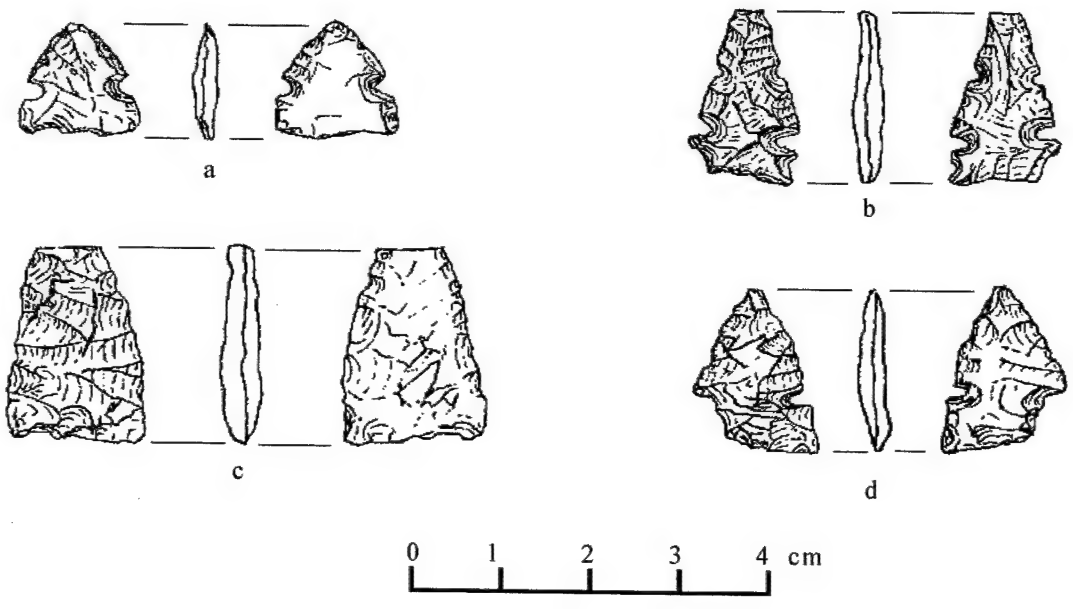


Figure 4.48: Projectile points recovered from 5LA8222: (a) 5LA8222.0.4; (b) 5LA8222.0.6; (c) 5LA8222.0.10; (d) 5LA8222.0.12.

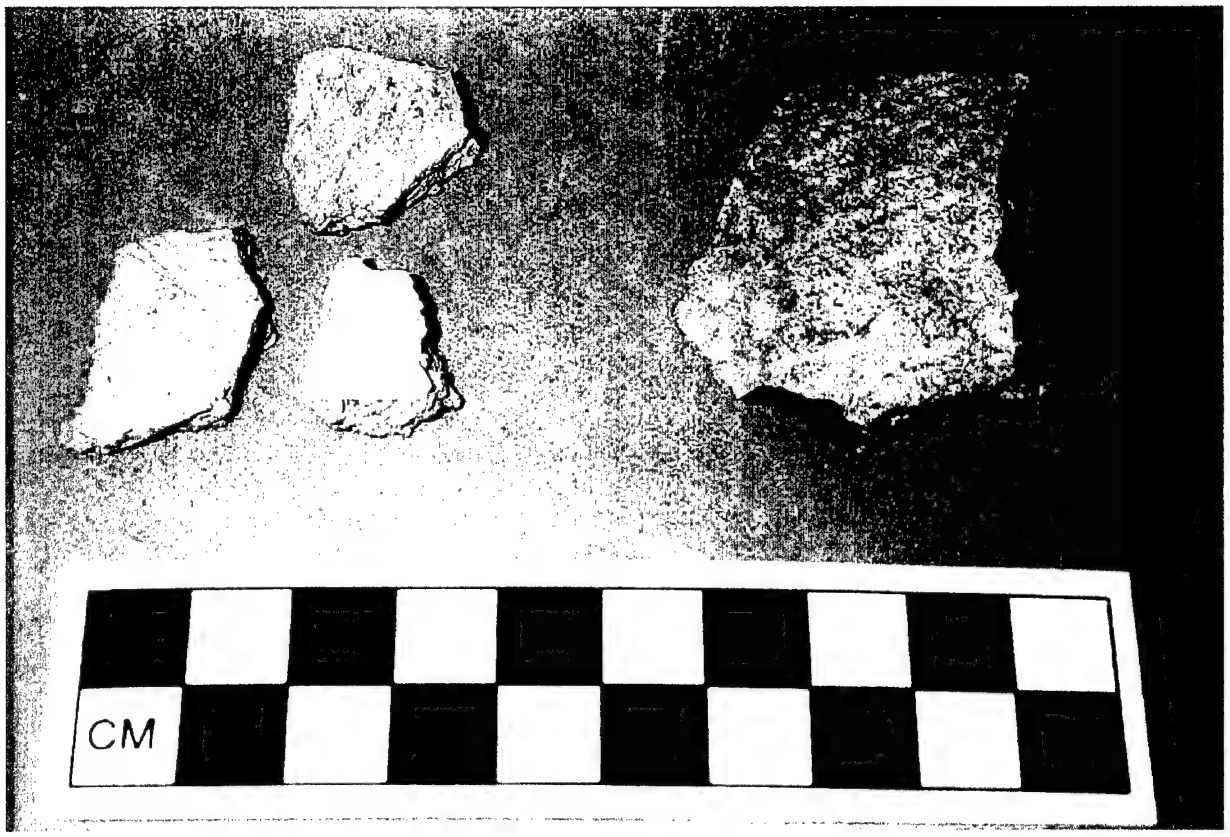


Figure 4.49: Ceramic artifacts from 5LA8222.

Table 4.11: Summary Description of Chipped-Stone Debitage for 5LA8222.

	Argillite	Chert	Quartzite	Hornfels/Basalt	Silicified Wood
Total	6	5	14	35	1
Large	5	1	9	17	0
Small	1	4	5	18	1
Cortical	4	0	4	17	0
Noncortical	2	5	10	18	1
Complex	3	1	6	14	0
Shatter	0	0	0	2	0
Simple	3	2	6	19	0
Biface-thinning	0	2	2	0	1

Table 4.12: Stone Tool Type by Material Group for 5LA8222.

Material	Type					
	Biface	Core	Projectile Point	Scraper	Retouched/Utilized Flake	Total
Argillite	0	0	0	1	0	1
Chalcedony	0	0	1	0	0	1
Chert	0	0	0	2	1	3
Coarse-grained Quartzite	1	0	2	0	0	3
Fine-grained Quartzite	0	0	3	0	0	3
Hornfels/Basalt	0	1	0	0	0	1
Orthoquartzite	0	0	0	0	1	1
Silicified Wood	0	0	1	0	0	1
Total	1	1	7	3	2	14

All phases of raw material reduction are seen in the debitage assemblage. Forty-one percent of the debitage specimens showed dorsal cortex, and this cortex is exclusively found in argillite, hornfels/basalt, and coarse-grained quartzite items. Of the cortical specimens, 18 were classified as large and seven were small. In the noncortical specimens 14 were large and 22 were small. All cortical flakes and the noncortical large flakes appear to be the result of core-reduction activity, or in some small part, early-stage biface manufacture. It appears all stages of core reduction are represented. The large number of small noncortical flakes suggests late-stage biface reduction activities as well. The biface-thinning flakes are represented by three material types, so at least that many bifaces were manufactured or reworked on site. Two of the biface-thinning flakes are very small and could be further classified as minute-retouch flakes. Heat treatment was not evident in the debitage assemblage.

There are 14 flaked lithic tools which fall into the following classes: projectile point (7), end/side scraper (3), retouched/utilized flake (2), unfinished biface (1), core (1). All were recovered randomly from the site surface with no apparent concentration. The chipped-stone tools are made of most of the same material types as the debitage (Table 4.12). Most tools are quartzite (coarse-grained, 21%; and fine-grained, 21%) and chert (21%). Chalcedony, silicified wood, argillite orthoquartzite, and hornfels/basalt are represented by one item each. These materials are 43% microcrystalline, 36% cryptocrystalline, and 21% macrocrystalline. The proportion of macrocrystalline materials with conchoidal fracture properties is nearly the same in the stone tool assemblage when compared to the debitage assemblage. The largest difference occurs in the cryptocrystalline and microcrystalline categories. There is a strong selection preference for cryptocrystalline materials for tool manufacture.

Not counting the two fragmented projectile points, the remaining five points are similar in size (Figure 4.48). A review of Anderson (1989) suggests they are classified as P49, P80, P83, and P79 projectile points. The P49 points (5LA8222.0.9 and 5LA8222.0.10) have dates that extend from AD 800 to AD 1750. A third projectile point (5LA8222.0.4) resembles Anderson's (1989) Type P80, which has a wide temporal range of between AD 1000 and AD 1750. The fourth specimen (5LA8222.0.6) fits into Anderson's (1989) Type P83, which has a temporal range from between AD 750 to AD 1650. The last point (5LA8222.0.12) is a P79, with a date

range of AD 1000 to AD 1750. Based on these artifacts, it seems likely that the site had a Late Prehistoric occupation (AD 100 to AD 1725). This date is consistent with the age of the ceramic artifacts.

Two pieces of ground stone are recorded at the site. They are both slab metate fragments and made of sandstone. No evidence for heat exposure was evident.

Ceramic Artifacts

Eight cordmarked sherds were collected from three separate locations on site and represent fragments from a single cordmarked jar (Figure 4.49). Of the sherds, six are body fragments and two are base fragments. Ceramics of this type are associated with Woodland Period occupation. Appendix I shows additional artifact data for the collected ceramic artifacts.

Interpretation and Summary

The site is a lithic scatter that may be buried by eolian deposits. Because the site is partly covered in sand it is possible that intact subsurface cultural deposits could be located. The site exhibits soil deposits of up to 50 cm, and a thermal feature that may indicate the presence of intact buried deposits. The ground- and chipped-stone tools at the site indicate the primary activities were raw material reduction, tool manufacture, and food processing. The presence of a hearth suggests cooking and possible habitation. Non-local Black Forest silicified wood, projectile points, burned bone, ground-stone artifacts, and ceramics are useful for addressing the research domains of chronology, subsistence, trade and exchange, and possibly paleoenvironment. Artifact density is relatively high, though there are no clearly defined artifact concentrations. This site should be temporarily fenced for its protection. The site should also be revisited periodically to determine if additional artifacts or features are eroding out of this active dune sequence. The area around Feature 1 and the ceramic localities are perhaps good places for testing. If cultural deposits or features are encountered, then a permanent fence should be constructed. If no cultural deposits are encountered through testing, then the temporary fence can be dismantled and no further work would be recommended.

Chapter V : Non-Eligible Sites

During cultural resource survey work, 170 previously unrecorded sites were located in Training Area 7 of the Piñon Canyon Maneuver Site. Evaluations of the sites indicate that 12 sites should be nominated to the National Register, and a total of 158 sites should not be considered eligible for the National Register. These non-eligible sites require no further work. However, because we did collect artifacts from the sites, it is important that they are discussed in some detail, and that is what we will do in this chapter. The 12 sites eligible for the National Register are described in Chapter IV. Descriptive tables summarizing selective information about all the sites recorded or revisited in Training Area 7 can be found in Appendices G and H.

5LA8011

The site is a small and discrete cluster of lithic artifacts on top of a ridge overlooking a side drainage of the Purgatoire River. The site is located completely outside the mechanized training area. Lithic artifacts recovered on site consist of ten flakes and one utilized flake. Of the flakes, six are hornfels/basalt, two are chert, one is argillite, and one is quartzite. Over half are classified as simple flakes (6), with complex flakes (2) and shatter (2) also seen. The utilized flake is made of fine-grained quartzite and exhibits moderate use wear on the acute, left lateral edge. Because this is a small site with no diagnostic artifacts or features, additional research is not recommended.

5LA8012

The site consists of a small scatter of debitage located on a flat bench/ridge above an unnamed drainage. A small bedrock outcrop is seen on the east edge of the site. A selection preference for argillite (19) is seen in the material type, with hornfels/basalt (4), quartzite (4), and obsidian (1) also represented. The obsidian source is Polvadera Peak in New Mexico. Classifications for the 28 debitage specimens are simple flakes (16), complex flakes (8), shatter (3), and biface-thinning flakes (1). No flaked or ground-stone tools were found, and no thermal features are noted. Further work is not recommended.

5LA8014

The site consists of three hornfels/basalt cores, one basin metate fragment, and one hornfels/basalt flake. The artifacts appear to be eroding downhill from a gently sloping ridge top located above an unnamed drainage that flows into the Purgatoire River. The soil is less than 15 cm in depth, with areas of bedrock exposed throughout the site area. This information, coupled with low artifact counts, lack of features, and lack of diagnostic artifacts, shows the site is not worthy of additional investigation.

5LA8015

Site 5LA8015 is a sparse lithic scatter located on a grassy plain, with a small knoll composed of sandstone bedrock visible to the southeast and a shallow, intermittent drainage to the north-northwest. The artifact assemblage includes nine pieces of debitage, one flaked stone tool, and one metate fragment. The debitage is nearly all simple flakes (6), with shatter (2) and one complex flake also seen. Material types are hornfels/basalt (7), chert (1), and quartzite (1). The flaked-stone tool is classified as a large argillite uniface with use wear visible on the distal end. The area appears subject to erosion, and no features were identified on site. Additional research is not recommended.

5LA8016

The site is a small, lithic scatter located in the flat grasslands north-northwest of Van Bremer Arroyo and just west of a small, unnamed drainage. The scatter consists of 17 hornfels/basalt flakes and one chert flake. The small size of the site assemblage and lack of thermal features make this site a poor candidate for additional research.

5LA8017

The site is one standing structure and three other probable structures along with associated trash. It is situated approximately 20 m from an unnamed drainage that flows south into Van Bremer Arroyo. The standing structure (Feature 1) is constructed of adobe bricks and likely represents the house. The remaining three features are a possible ramada (Feature 2), a dugout (Feature 3), and a possible privy (Feature 4).

The scatter of artifacts is primarily outside the front of Feature 1 and can be attributed to household activities. Artifact classes include bottle glass, window glass, ceramics, sanitary cans, and buckets. Construction materials include milled lumber, modified sandstone slabs, and wire nails. Based on the artifact assemblage and the similar architectural style to other structures in the immediate area, the site likely dates ca. 1910-1930. The historic remains are relatively recent and not significant.

5LA8018

The site is just west of an unnamed drainage on a gently sloping plain in close proximity to Van Bremer Arroyo. The site consists of a lithic scatter that includes an unfinished quartzite biface, a large, chert bifacial core-tool, and several flakes. Of the flakes, seven are classified as simple, six are complex, and four are shatter. Material types are hornfels/basalt (12), chert (3), and quartzite (2). Some of the site could be buried, owing to exposed flakes and a hearth (Feature 1) at the edge of the two-track road. No temporally diagnostic artifacts were recovered.

5LA8019

The site is defined by the extent of the lithic scatter and consists of flakes and two manos. The site is located on a gently sloping terrace above an unnamed side drainage of Van Bremer Arroyo and just to the south of 5LA8018. The flakes are mostly hornfels/basalt (10), with some chert (2), argillite (1), and quartzite (1). No surface indications of thermal features and no diagnostics were found. Additional research is not warranted.

5LA8020

The site consists of a very sparse scatter of tools and is located on the upper edge of an unnamed drainage in juniper scrubland. Artifacts recovered include a quartzite projectile point, a sandstone mano, and a hornfels/basalt core. The projectile point is side-notched (Anderson's Type P47) and likely dates to the Archaic stage. The site is highly exposed to wind and water erosion, and little deposition remains in the site area. Further work is not recommended.

5LA8021

The site consists of flakes, flaked tools, and ground-stone artifacts located at an interstitial area of plains and juniper scrub. The terrain contains large sandstone outcrops, gentle slopes, and is relatively flat. Vegetation on the site includes juniper, prickly pear cactus, yucca, various grasses, and cholla.

The flakes, analyzed on site, are made of hornfels/basalt (27), quartzite (4), Alibates dolomite (3), locally available chert (2), and argillite (1). Reduction stages for the flakes are simple (24), complex (9), and shatter (4). The tool assemblage consists of two unfinished bifaces (one quartzite, one argillite), one quartzite projectile point fragment, one argillite uniface tool, one hornfels/basalt non-bipolar core, one sandstone mano, and one argillite core-tool. Only the base of the projectile point remains and is classified as Archaic.

The area is heavily eroded, and many of the artifacts are located on exposed sandstone. No surface features are noted, and the site does not have research potential.

5LA8022

This is a dense lithic scatter that extends from a grassy plain onto a sandstone outcropping overlooking an unnamed drainage that flows south to Van Bremer Arroyo. Artifacts include debitage, one projectile point, and several types of ground- and flaked-stone artifacts. Sage, prickly pear cactus, grama grass, juniper, yucca, and cholla are growing on site.

Unlike most of the sites in the area, chert (33) is the dominant material type, with hornfels/basalt (23), argillite (18), quartzite (6), silicified wood (3), obsidian (2), and quartz (2). Surface flaking debris is classified as 51 simple flakes, 25 complex flakes, and 11 pieces of shatter. One argillite projectile point, one argillite end scraper, one quartzite uniface tool, and one chert and one quartzite bifacial core-tool comprise the flaked-tool assemblage. The unstemmed projectile point (Anderson's Type P48) is quite small and apparently dates to the

Late Prehistoric (AD 500 to AD 1400). The ground-stone artifacts are all sandstone and include three metate fragments, two mano fragments, and a sandstone boulder with a surface grinding slick.

The site condition is good, but artifacts are washing downslope into the arroyo. Subsurface deposits are shallow with no surface indications of thermal features. Though non-local (Polvadera Peak and Cerro del Medio) obsidians were found, this site will not yield additional information.

5LA8025

The site is a sparse lithic scatter located above an unnamed drainage and directly east of the head of another unnamed drainage. The artifact inventory includes 18 pieces of debitage and one utilized flake. Hornfels/basalt with 15 specimens is the dominant material type, with three quartzite specimens also represented. The debitage assemblage suggests lithic reduction was the dominant site activity. Two-thirds (12) of the specimens are classified as simple flakes, four are shatter, and two are complex flakes. The utilized flake is made of chert and exhibits light use wear on the steep distal end. No features are noted, and very little intact soil remains. The site is not significant.

5LA8026

The site is a sparse lithic scatter consisting of flaking debris and two core-tools. It is situated on flat grassland with cholla, prickly pear, and grama grasses at the surface. The flakes are classified as 11 simple and 2 complex. The material types are hornfels/basalt (8), argillite (3), and chert (2). The large, crude, bifacial core-tools are made of chert and hornfels/basalt. The soils are not well developed and have been disturbed by water erosion. No evidence for thermal features was seen. No additional work is recommended.

5LA8027

The site is a single hole-in-cap can located within a disperse lithic scatter. The topography is generally flat, though the site slopes down onto a bedrock outcrop. The surface assemblage consists of nine pieces of debitage and one mano. Of the flakes, seven are hornfels/basalt. The two remaining specimens are argillite and chert. The site does not warrant further research and has been eroded due to water and/or wind erosion.

5LA8029

The site is a sparse lithic scatter located on a grassy plain above an unnamed side drainage that flows into Van Bremer Arroyo. Eleven pieces of chipped-stone debitage were observed at the site; all are argillite. Classifications for these are nine simple flakes, one complex flake, and one piece of shatter. Considerable soil depth was observed and intact subsurface deposits could be possible, but there are no surface indications of thermal features. The site does not appear to have been eroded. No additional work is recommended for the site.

5LA8030

The site consists of a large lithic scatter on a generally level plain above an unnamed drainage. The scatter extends off the plain, downslope, over an area of exposed bedrock. Many artifacts were recorded on the exposed bedrock, suggesting that they are eroding from intact soils on the level plain and washing downslope. Surface vegetation includes various grasses, prickly pear, yucca, juniper, and rabbit brush.

The artifact assemblage consists of 116 pieces of debitage, 6 flaked stone tools, and 1 piece of ground stone. Of the flakes, 63 are classified as simple, 29 are complex, 23 are shatter, and 1 is a bifacial-thinning flake. The majority are hornfels/basalt (60) and argillite (38), with lesser amounts of chert (11), quartzite (5), chalcedony (1), and quartz (1) represented. The flaked-stone tools are three non-bipolar cores (two quartzite, one argillite), one chert utilized flake, one fine-grained quartzite uniface, and one chert projectile point. The projectile point does not fit into an Anderson (1989) typology class, but is classified as Late Prehistoric. The ground-stone artifact is a mano fragment.

Because this is a dispersed site with no surface features, additional research is not recommended.

5LA8031

The site is on a level plain above an unnamed drainage that flows west and south into Van Bremer Arroyo. The site is associated with 5LA5503 (a rockshelter), which is in the drainage below and geographically separated by caprock. No diagnostic tools were found. The identified tools include two biface fragments (one quartzite, one chert), one argillite end/side scraper, and one argillite non-bipolar core. The flaking debris is argillite (13), hornfels/basalt (11), and chert (1), and is further classified as 13 simple flakes, 6 pieces of shatter, 5 complex flakes, and 1 bifacial-thinning flake. The site is insignificant, with low artifact density and little deposition. Also, no surface indications of thermal features are noted and no diagnostics were found.

5LA8032

The site consists of a sparse debitage scatter on a grassy plain overlooking the head of an unnamed drainage. Soil deposition does not exceed 20 cm on site, and surface visibility is good. A selection preference for argillite (10) and hornfels/basalt (7) is seen in the material type, with one quartz flake also represented. Classifications for the 18 debitage specimens are simple flakes (10), complex flakes (4), and shatter (4). No flaked- or ground-stone tools were found, and no thermal features are noted. Further work is not recommended.

5LA8033

The site sits on a grassy plain directly east of a modern cattle tank and is composed of one quartzite complex flake and a bedrock metate (Feature 1) on an exposed sandstone slab. The lack of artifacts can be attributed to construction of the cattle tank and poor surface visibility. No other features were identified, and no additional research is recommended.

5LA8034

The site is a sparse lithic scatter located on a grassy plain near the head of an unnamed drainage. Exposed bedrock and deflated areas make up some parts of this site. Artifacts recorded include 11 pieces of debitage, one unfinished argillite biface, and one hornfels/basalt non-bipolar core. Seven of the eleven pieces of debitage are simple flakes. Of the four remaining, three are shatter and one is a complex flake. The debitage is made of hornfels/basalt (8), argillite (2), and chert (1). No features were found, and no ground stone was recovered.

5LA8035

The site is a low-density lithic scatter on a grassy rise that overlooks Van Bremer Arroyo. The surface visibility is good and the vegetation is sparse grass. The site consists mainly of debitage, which is made of chert (12), quartzite (8), argillite (2), quartz (2), hornfels/basalt (1), silicified wood (1), and Alibates dolomite (1). Debitage reduction stages are complex flakes (17), simple flakes (9), and bifacial-thinning flakes (1). This site differs from others in the area in that hornfels/basalt and argillite are not the dominant material types, and complex flakes outnumber the simple. Collected artifacts consist of five tools located at the edge of the site: two scrapers and three bifaces. The bifaces are argillite, chert, and hornfels/basalt and are described as unfinished. The scrapers are one chert and one quartzite specimen. Feature 1 is a stone ring that measures 7.2 m in diameter. There may be additional stone rings, but these are indistinct, owing to natural basalt boulders scattered throughout the site area. The site does not appear to have potential for additional research.

5LA8036

The site is a sparse scatter of lithics located at the top of a sparsely grassed ridge with areas of exposed bedrock. The site is overlooking the confluence of two unnamed drainages that branch off of Van Bremer Arroyo. The lithic scatter (33 specimens) consists of mostly argillite (61%), quartzite (21%), and hornfels/basalt (12%) debitage, with fewer chert (3%) and quartz (3%) specimens represented. Two retouched flake tools (one argillite, one chert) were found in an area disturbed by sheetwash erosion. There is no evidence for thermal features, and no diagnostic artifacts were recovered. The erosional nature of the site makes it a poor candidate for further research.

5LA8038

The site is a sparse lithic scatter with the following dimensions: approximately 100 m north-south by 84 m east-west. The site is 550 m east of Van Bremer Arroyo on a flat covered area with grasses, yucca, prickly pear, and juniper trees growing at the surface. The soil is a silty loam. There is no distinct lithic concentration, and artifacts are scattered randomly throughout the site area. The majority of the site assemblage is comprised of debitage made from the following materials: argillite (39), chert (9), quartzite (8), hornfels/basalt (2), quartz (1), and silicified wood (1). The artifacts include two scrapers: one is an informal, retouched flake made of argillite, and the other is a patterned end/side scraper made of quartzite. No features are noted, and no further work is recommended for the site.

5LA8039

The site is a large lithic scatter with dimensions measuring approximately 155 m north-south by 135 m east-west. It is located on the southeast slope of a shallow basin and is 500 m east of Van Bremer Arroyo. On-site vegetation is mostly grasses, a few small cholla, and prickly pear cactus. No tools were recovered, and no features are noted. Over 95% of the 151 pieces of debitage are argillite. The remaining specimens are hornfels/basalt, chert, and quartzite. Over half (81) of the debitage specimens are simple flakes, with complex flakes (66), biface-thinning flakes (3), and one piece of shatter also noted. The site lacks potential for establishing its age.

5LA8040

The site consists of one chert projectile point (Anderson's Type P45, Archaic) and three flakes (two argillite and one chert). One argillite flake shows light usage along one edge. Cholla, yucca, prickly pear, low sage, and grama grass are growing in the immediate site area, which is located on the gentle slope of a rolling plain. Bedrock outcrops and bare patches of soil provide good surface visibility. The site is not significant.

5LA8041

The site consists of a small lithic scatter on the upper edge of an unnamed drainage. Outcropping sandstone is present on the south, east, and north edges of the site. The debitage is made of argillite (6), hornfels/basalt (2), and quartzite (1), though natural basalt nodules and cobbles are scattered across the surface. Over half (5) of the debitage specimens are simple flakes, with complex flakes (3) and shatter (1) comprising the remainder. One retouched basalt flake was collected and no ground-stone tools were found. No thermal features are noted at the surface. The site is not a good candidate for further work.

5LA8042

Site 5LA8042 is located on a grassy plain, sloping down to Van Bremer Arroyo to the west of a rocky outcrop. No eroded remains of thermal features are evident, and the surface evidence for the site is one chert non-bipolar core and six pieces of basalt debitage. Of these, four are complex flakes and two are simple flakes. This sparse reduction site is not significant.

5LA8043

This large site consists of a historic trash dump (Feature 1), scattered ground stone, and debitage. It is located on a mesa top covered with juniper trees, mountain mahogany, cholla, prickly pear, and various grama grasses. Soil deposition on the site is poor, and the surface is subject to water erosion. Surface visibility is good.

The lithic artifacts consist of 66 specimens (50 debitage, 14 flaked tools, and two manos). The debitage specimens are 25 simple flakes, 21 complex flakes, 3 biface-thinning flakes, and 1 piece of shatter. A selection preference is seen for hornfels/basalt (15), chert (14), and quartzite (12), with argillite (5), chalcedony (2), and obsidian (2) also noted. The materials are 78% cryptocrystalline or microcrystalline, and 22% macrocrystalline materials with some degree of conchoidal fracture properties. Both obsidian types can be found in the Jemez Mountains of New Mexico and are from the Polvadera Peak and Obsidian Ridge sources. Functional groups for flake tools are four end/side scrapers, three large bifaces, four projectile points, two non-bipolar cores, and one end scraper. Three of the four points correlated to the Anderson (1989) typology. Of these, one basalt specimen is P27, another basalt specimen is P69, and the fine-grained point is P79. One large basalt point fragment could not be "typed." Table 5.1 below presents the material types for the flaked tools.

Feature 1 is a historic trash scatter extending 28 m north-south by 22 m east-west. Artifacts include whiteware, purple glass, aqua-blue glass, dark brown glass, tin cans, undistinguishable metal fragments, and the bottom of a bottle that is broken into two fragments. No evidence for long-term historic occupation was present on the historic component, which is most likely the result of a temporary logging camp. Additional work is not recommended for this locale.

Table 5.1: Artifact Type by Material Group for 5LA8043.

	Material Type							
Type	Alibates	Chert	Fine Quartzite	Hornfels/Basalt	Quartzite	Argillite	**Total**	Pct.
End/Side Scraper	1	3	0	0	0	0	4	28.57%
Large Biface	0	2	0	0	0	1	3	21.43%
Small Patterned Biface	0	0	1	2	0	0	3	21.43%
Non-Bipolar Core	0	1	0	0	1	0	2	14.29%
End Scraper	0	1	0	0	0	0	1	7.14%
Large Patterned Biface	0	0	0	1	0	0	1	7.14%
Total	1	7	1	3	1	1	14	100.00%
Pct.	7.1%	50.0%	7.1%	21.4%	7.1%	7.1%	100.0%	

5LA8044

The site is a very sparse lithic scatter consisting of two artifacts: one small chalcedony corner-notched projectile point and one hornfels/basalt complex flake. The site is located on a floodplain west of an unnamed drainage and is subject to water erosion. This Late Prehistoric projectile point is similar to Anderson's (1989) Type P60 and was collected. The site is not significant.

5LA8045

The site is positioned on top of a small mesa that rises approximately 15 m from the floodplain containing two unnamed drainages. A number of artifacts, including tools, flakes and ground stone, had been deposited over an expansive area. A total of 88 flakes were analyzed in the field and are made of hornfels/basalt (39), chert (16), fine-grained quartzite (12), silicified wood (9), coarse-grained quartzite (5), chalcedony (3), limestone (2), Polvadera Peak obsidian (1), and argillite (1). Seven tools were recorded, though none are time diagnostic. These include a basalt hammerstone, one silicified wood patterned biface, one argillite drill, one Alibates dolomite end scraper, two end/side scrapers (one Alibates dolomite, one Black Forest silicified wood), and one quartzite non-bipolar core. The presence of several non-local materials possibly reflects extensive group movement outside the PCMS area or some trade network. Soil deposition is shallow, and no thermal features are noted. Additional research is not warranted.

5LA8046

The site is located on a grassy plain with a slight slope to the south. It is a sparse lithic scatter consisting of 19 pieces of flaking debris. Material types include chert (8), obsidian (4), hornfels/basalt (3), fine-grained quartzite (2), and silicified wood (2). Of the obsidian specimens, three are from the Cerro del Medio source, and one is the Polvadera Peak variety. Over half (10) of the debitage specimens are simple flakes, with complex flakes (8), and one bifacial-thinning flake making up the remainder. The site is subject to water erosion. A small north-south trending drainage and an east-west road cut through the site. Because there is little soil deposition and a lack of surface features, no additional work is recommended.

5LA8047

The site is located on a grassy terrace with a small mesa to the north. To the south and southwest, the site is bordered by the edge of the terrace. The site consists of a 120 m east-west by 76 m north-south scatter of debitage, with an absence of flaked- and ground-stone tools. Chipped-stone debitage is made of chert (12), obsidian (4), coarse-grained quartzite (3), silicified wood (3), and fine-grained quartzite (1). Two obsidian specimens (5LA8047.0.2 and 5LA8047.0.3) come from the Polvadera Peak source locale of the central portion of the Jemez Mountains of New Mexico. The remaining two are Cerro del Medio (5LA8047.0.1) and an unknown source location (5LA8047.0.4). Classifications for the debitage specimens are simple flakes (12), complex flakes (8), biface-thinning flakes (2), and shatter (1). The site is slightly disturbed by water erosion and shows little soil deposition. Thus, no research potential remains.

5LA8048

The site is a low-density lithic scatter on a gently sloping terrace immediately east of a floodplain. Surface visibility is good, though no features were observed. The artifact assemblage consists of one argillite non-bipolar core, ten basalt flakes, and seven argillite flakes. Eleven pieces of debitage are simple flakes, four are complex flakes, and two are shatter. Little deposition is seen. Further work is not warranted.

5LA8049

The site is a low-density lithic scatter consisting of debitage and one Late Prehistoric (Type P79) projectile point. The site is located on a slope to the west of a floodplain and has been lightly disturbed by wind and water erosion. Vegetation on site and in the surrounding area consists of grama grass and low sage. Juniper trees are present on the small mesas, about 100 m to the north. Ten of the 16 pieces of debitage are classified as simple flakes. Of those remaining, four are complex flakes and two are shatter. Unlike most of the sites in the area, argillite and basalt are not present in the assemblage, and all materials are cryptocrystalline. Material types are silicified wood (5), fine-grained quartzite (5), chalcedony (3), and chert (3). Because the site is small and no features were seen, additional work is not warranted.

5LA8050

The site is located on a floodplain next to a low mesa. Artifact density is low, dispersed, and made up of two patterned bifaces and debitage. This scatter consists of eleven simple flakes, eight complex flakes, and two bifacial-thinning flakes. Silicified wood (8) and chert (6) are the dominant material types, with lesser amounts of obsidian (3), fine-grained quartzite (2), chalcedony (1), and hornfels/basalt (1) also represented. All of the obsidian debitage samples are from the Polvadera Peak source locale. Both bifaces are made of nonlocal materials. The small projectile point (Type P26) is Alibates dolomite, and the large patterned biface is unknown obsidian. The site is subject to water and/or wind erosion, animal burrowing is present, and no thermal features were recorded. The site is not significant.

5LA8051

The site is a historic trash scatter located on a terrace next to the hogback above Van Bremer Arroyo. The site is visible on barren patches of ground in a sparse grassland plant community. The site presents moderate artifact density, and the majority of the artifacts noted on the site are glass bottle fragments and tin cans. The only time diagnostic artifacts are two whiskey bottles with lipping tool finishes (1870-1920) and 20-25 pieces of amethyst glass. All artifacts are scattered randomly throughout the site and were likely displaced by episodic sheetwash activity or flooding from Van Bremer Arroyo. This trash-dumping episode is likely related to Brown Sheep Camp. A single chert flake comprises the prehistoric component. The lack of structures and the secondary nature of the fill make the site not worthy of additional investigation.

5LA8052

The site 5LA8052 is located on the south side of Van Bremer Arroyo, approximately 50–75 m north of the hogback. Dimensions are 80 m east-west by 70 m north-south, but the site lies on a northeast-southwest axis. Surface vegetation is grass (hairy grama and bunch), saltbush, tamarix, cholla and prickly pear. Amidst the vegetation are large eroded areas where most of the lithic material is found. Four areas of thermally altered sandstone are noted and likely represent deflated hearths (Features 1-4). The highly eroded site appears to be impacted by overbank deposits and flooding in Van Bremer Arroyo.

The artifact assemblage consists of 73 pieces of debitage, 14 flaked tools, and 5 pieces of ground stone. Of the debitage specimens, most (41) are complex flakes, with simple flakes (27), bifacial-thinning flakes (3), and shatter (2) also recorded. Argillite (25), quartzite (20), chert (15), hornfels/basalt (11), Polvadera Peak obsidian (1), and silicified wood (1) comprise the material types. Tool groups for the flaked tools are bifaces (3), uniface tools (3), large, crude core-tools (3), dart points (3), small projectile points (1), and non-bipolar core (1). All the projectile points, Types P4, P37, P42, P58, and P51, were collected. Material types for flaked tools are shown in Table 5.2. The ground stone was found in the northeast portion of the site. Three metate fragments made on chunks of basalt from the hogback and two sandstone manos were recorded.

Pieces of fire-cracked rock are scattered randomly across the entire site surface, and buried deposits are unlikely. The disturbed nature of this site makes it ineligible.

5LA8053

The site is found on a terrace next to the hogback and southeast of Van Bremer Arroyo. Vegetation is sparse and consists of grama grass, cholla, low sage, and prickly pear. The site is a sparse scatter of complex (9) and simple (10) flakes. Hornfels/basalt (7), argillite (6), chert (4), and quartzite (2) are the material types observed on site. The site has low artifact density and little deposition. No surface indications of thermal features were seen and no diagnostic artifacts were found.

Table 5.2: Artifact Type by Material Group for 5LA8052.

	Material Type								
Type	Argillite	Chert	Dendritic Chert	Hornfels/Basalt	Obsidian	Quartzite	Orthoquartzite	Total	Pct.
Projectile Point	0	0	0	0	1	0	0	1	7.14%
Dart Point	0	0	0	0	0	3	0	3	21.43%
Biface	0	1	1	0	0	0	1	3	21.43%
Uniface	1	0	0	1	0	1	0	3	21.43%
Non-bipolar Core	0	0	0	1	0	0	0	1	7.14%
Core-tool	0	0	0	0	0	3	0	3	21.43%
Total	1	1	1	2	1	7	1	14	100.00%
Pct.	7.1%	7.1%	7.1%	14.3%	7.1%	50.0%	7.1%	100.0%	

5LA8054

The site is a sparse scatter of lithics located north of the hogback in an open plain. Van Bremer Arroyo sits 250 m north of the site boundary. The vegetation community is sparse grassland, and the site has been disturbed by episodic sheetwash activity. Half (11) of the flaking debris is argillite. The remaining material types are hornfels/basalt (6), chert (4), and quartzite (1). The debitage is nearly all complex (11) and simple (9) flakes, with one biface-thinning flake and one piece of shatter also seen. The small size of the site assemblage and lack of thermal features make this site a poor candidate for additional research.

5LA8055

The site is located in an open plain north of Van Bremer Arroyo and east of MSR 2. It is a sparse scatter of lithic debitage that is visible in eroded, barren patches of ground, with little or no vegetation. No tools or features were found. The debitage is chert (7), argillite (6), quartzite (6), and hornfels/basalt (2). Of these, eight are simple flakes, seven are complex flakes, five are bifacial-thinning flakes, and one is shatter. The presence of biface-thinning flakes suggests that some working of bifaces occurred at the site. Further work is not recommended.

5LA8056

The site is located north of the hogback ridge and east of MSR 2 at an elevation of 5,320 ft. It is a sparse lithic scatter composed of argillite (6) and basalt (3) flakes. The site is visible mainly in eroded, open, barren patches of gravel with little or no vegetation. No features are noted and no flaked- or ground-stone tools were reported.

5LA8057

The site consists of two house foundations (Features 1 and 3), a cistern (Feature 4), a rock cluster (Feature 6), a depression that may be a root cellar (Feature 2), and a large historic trash scatter with one major concentration (Feature 5). A few pieces of prehistoric lithic debris were noted at the surface. This site is located on a gently dipping slope above and to the north of Burke Arroyo and 700 m northeast of the Burke Windmill. There are several sandstone bedrock outcroppings on site, and soil deposition is present throughout. In different areas of the site, the soil depth varies from 0 to 50 cm.

Household artifacts, estimated to date at 1920's to 1930's, was found in and around Features 1 and 3. The glass included a bottle base fragment of blue-green glass, machine-made, with "ABCO 9 " on the bottom and a machine-made, clear bottle with a patent finish applied lip. Additional household artifacts include China cup and plate fragments, solder-sealed 2"cans, tobacco tins, baking powder can fragments, and decorative tin pieces. Construction material included wire nails and milled lumber.

The prehistoric assemblage consists of five flakes, one shatter specimen, a single sandstone mano fragment, and a projectile point base. All debitage items are made of chert. The projectile

point is made of coarse-grained quartzite and most closely resembles Anderson's (1989) Type P40, which has associated dates of between 5100 BC and 2500 BC.

An old site datum was found, so it appears the site had been previously recorded. No record of the site exists in the PCMS database, nor did the site appear on the GIS-generated overlay for previously recorded sites within the 1998 study units. This site appears to have had an ephemeral occupation, with many of the artifacts and construction materials removed after abandonment. The site appears to be relatively recent (ca. 1920-1930) and is similar to several other better preserved historic sites on the PCMS.

5LA8058

The site is located 100 m north and upslope from Burke Arroyo on a series of erosional terraces. Two scatters of flaking debris make up the site, with the main concentration on the lower terrace. The upper area of the site shows sandstone outcropping with little vegetation and soil. Low sage, prickly pear, snakeweed, juniper, foxtail, needle and thread grass, and blue grama are noted at the surface.

The artifact assemblage consists of eighty-nine pieces of debitage, ten flaked tools, two ground-stone artifacts, and one unmodified shell specimen. The material types are argillite (46%), hornfels/basalt (37%), chert (11%), and quartzite (6%). The reduction classes for the debitage specimens are 46 simple flakes, 36 complex flakes, 6 pieces of shatter, and 1 biface-thinning flake. Sixty-two percent of the flakes show dorsal cortex, which suggests early-stage reduction of locally available materials as the dominant site function.

The tools are three bifaces, two manos, two non-bipolar cores, two projectile points, two scrapers, and one utilized flake. Of the bifaces, two were classified as non-finished and one is nearly finished. The material types are one each for fine-grained quartzite, basalt, and orthoquartzite. The cores are chert and argillite. The two small Late Prehistoric Stage projectile points are argillite (Type P80) and basalt (Type P50). The scrapers were classified as one Alibates dolomite end/side scraper and one hornfels/basalt side scraper. The utilized flake is made of chert.

Most of the site has eroded away to bedrock. Based on the lack of intact, buried deposits and fire features, no additional work is recommended.

5LA8059

This site is a medium-density scatter of lithics and ground stone just above and including a portion of Burke Arroyo. The north half of the site sits on a grassy plain, with a small marsh located on the southern edge of the site. The vegetation community is a combination of sparse grassland and juniper shrub. Most of the site has been highly impacted by Burke Arroyo, and the east edge is exposed sandstone bedrock. The majority of the artifacts and Feature 1 (deflated hearth) have been exposed due to mechanized activity and do not seem to extend too far below the surface. Also, artifacts are noted in the barren patches between areas of vegetation. A modern water diversion dam is seen at the north edge of the site.

A total of 78 artifacts were recorded at the surface, including sixty-eight pieces of flaking debris, eight flaked tools, and two ground-stone artifacts. The debitage was found to be made of argillite (26), hornfels/basalt (24), quartzite (9), chert (8), and silicified wood (1). Over half were classified as simple flakes (40), with complex flakes (17), shatter (6), and biface-thinning flakes (5) also seen. The tools are two argillite and two hornfels/basalt non-bipolar cores, two bifaces (one chert, one quartzite), one chert side scraper, and one hornfels/basalt utilized flake. The ground stone artifacts are one quartzite mano fragment and one sandstone metate fragment.

No diagnostic artifacts were found at the surface of the site, and the soil does not appear to be very deep. No further work is recommended for this site.

5LA8060

The site is a sparse lithic scatter situated 600 m northwest of Burke Arroyo, and it lies just south and east of a water diversion ditch. The site artifacts are visible in the open areas between the low, sparse vegetation. The surface slopes gently to the southeast in a grassy plain area. This lithic reduction area shows eight flakes, including five argillite, two basalt, and one chert. All display dorsal cortex and are further classified as simple flakes (5), complex flakes (2), and one piece of shatter. No tools or features were found on site.

5LA8061

The site is located 140 m north of Burke Arroyo on a flat grassy plain with very little topographic relief. A modern two-track road that bisects the western boundary impacts the site. Lithic artifacts recovered at the site consist of 28 flakes and 1 utilized flake. Of the flakes, 12 are chert, 6 are hornfels/basalt, 4 are silicified wood, 4 are argillite, and 2 are quartzite. Nearly half (13) are classified as complex flakes, with simple flakes (11), shatter (3), and one biface-thinning flake also seen. Five of the flakes show dorsal cortex. The utilized flake is made of quartzite and exhibits moderate use wear on both steep, lateral edges. Because this is a small site with no diagnostic artifacts or features, additional research is not recommended.

5LA8063

The site sits on a plain/grassland located near a historic cattle tank and is situated between Burke Arroyo and an unnamed drainage. Surface visibility is good (approximately 75%), with about 25 cm of soil deposition present. The exact depth of subsurface cultural deposits is unknown. The site has been lightly disturbed by wind and water erosion. The artifacts are sixteen simple flakes, six complex flakes, a piece of shatter, and a mano (FS1). A selection preference for argillite (13) is seen in the material type. The remaining specimens are hornfels/basalt (7) and chert (3). The mano is made of quartzite and exhibits heavy to moderate usage on both faces. No diagnostics or thermal features are noted. The site is not significant.

5LA8064

Site 5LA8064 is a sparse trash scatter located on the south face of an east-west trending ridge that is south of Burke Arroyo. It likely represents a single dumping episode with only a few artifacts present at the surface. The artifacts consist of glass sherds from two bottles, one earthenware container base, and fragments of two tin cans. The artifacts likely date ca. 1890-1920, based on the artifact types and the association with historic sites (including 5LA2316) in the area. The site is in good condition with light disturbance by military activity and wind or water erosion. No structures are noted on the site, and there are no indications that subsurface cultural deposits are present.

5LA8065

The site is a highly deflated lithic scatter with minimal lithic debitage and a few tools visible. The site is located on a plain approximately 10-20 m from an unnamed drainage. The site also contains two amorphous features (Features 1 and 2), consisting of thermally altered sandstone. The artifact assemblage includes 18 pieces of debitage, 3 flaked tools, and 5 pieces of ground stone. The debitage is 9 complex flakes, 7 simple flakes, and 2 pieces of shatter. Material types are argillite (50%), hornfels/basalt (22%), quartzite (22%), and chert (6%). The flaked-stone tools are classified as one chert biface, one chert end/side scraper, and one argillite non-bipolar core. Three metate fragments and two manos comprise the ground-stone tools. Subsurface cultural deposition is possible, although erosion is heavy. All of the tools and the majority of the flakes are very large and have not been displaced by the episodic sheetwash activity that takes place in the area. This suggests that all the smaller artifacts have washed away. Thermally altered rock is scattered randomly throughout the site area. Additional research is not recommended.

5LA8066

Based on the lithics seen at the surface, site 5LA8066 is a sparse lithic scatter located on a hill overlooking Taylor Arroyo (to the north). The lithic materials are visible in the open, gravelly areas among the short vegetation. The debitage includes simple flakes (9), complex flakes (7), and shatter (3). Materials present are quartzite (32%), hornfels/basalt (26%), chert (26%), and argillite (16%). The three chipped-stone tools are one projectile point (type P26), one unfinished biface, and one retouched/utilized flake. The projectile point is made of chert and likely dates to the Late Archaic. The biface and utilized/retouched flake are quartzite. The site is not significant, based on the low artifact density and the lack of thermal features.

5LA8067

The site is a small, low-density lithic scatter located on an erosional terrace above and south of Taylor Arroyo. The artifacts are visible in bare patches of ground among low, sparse vegetation and in the modern two-track roads along the east edge of the site. Of the ten pieces of debitage recorded at the surface, eight specimens are complex flakes, one is a simple flake, and one is shatter. Lithic materials are quartzite (4), hornfels/basalt (4), argillite (1), and chert (1). Seven of the ten pieces of debitage show some cortex. A single basalt core is identified. The

site is subject to erosion, owing to sheetwash activity, and military trash covers the area. No features are noted, and the site is not significant.

5LA8068

The site is a sparse lithic scatter consisting of two complex argillite flakes, one basalt core, and one quartzite mano fragment. The site is situated on an eroded slope above an unnamed drainage leading into Taylor Arroyo (100 m northeast). No features are noted, and artifacts are visible in eroded areas between patches of grass, saltbush, and cholla. The site is not worthy of additional research.

5LA8069

The site is a sparse lithic scatter located on an eroded terrace just above Taylor Arroyo (along north edge of the site). The flaking debris consists of three complex basalt flakes. One sandstone mano fragment (FS1) was recovered in the southern portion of the site. The site has been deflated due to wind and water erosion and is seen in a gravel-filled blowout with no cultural fill or features noted in the sidewalls. Further work is not recommended for this site.

5LA8070

The site is located on a floodplain sloping down from a small mesa to the southwest toward Burke Arroyo. Vegetation is sparse, and surface visibility is good. Surface disturbance appears minimal. Owing to the location of the floodplain, soil deposition on the site is substantial. Artifacts consist of 44 pieces of debitage and the tip of a silicified wood biface. Silicified wood is the dominant material type, comprising 52% of the assemblage. The remaining specimens are 18% hornfels/basalt, 14% chalcedony, 9% fine-grained quartzite, 5% argillite, and 2% Cerro del Medio obsidian. Most (25) are classified as simple flakes, with complex flakes (16), biface-thinning flakes (2), and shatter (1) also represented. Only 20% of the debitage specimens show some degree of cortex. No features are noted, and the site is not significant.

5LA8072

The site is located on a slope below a small mesa, but does not extend onto the sides of the mesa. Vegetation is sparse and classified as combination sparse grassland and juniper scrub. The site has been lightly disturbed by water erosion and moderately disturbed by army maneuvers. Small in total number, the debitage specimens analyzed on site are four simple flakes, one complex flake, and one piece of shatter. Materials include basalt, silicified wood, fine-grained quartzite, and argillite. A single large basin metate fragment was recovered near the flaking debris and exhibits heavy use wear on both faces. No diagnostic artifacts or thermal features were found.

5LA8073

The site sits on a slope east of a mesa among several small drainages that flow east into Burke Arroyo. Vegetation is sparse and consists of Indian paintbrush, rabbit brush, and various grasses. Surface visibility is excellent, and the primary disturbance to the area consists of water erosion. The flaking debris, analyzed on site, is made of silicified wood (9), quartzite (1), and chert (1). Classifications show seven simple flakes, three complex flakes, and one piece of shatter. A single end/side scraper made of orthoquartzite is also noted and exhibits light to heavy use wear on the steep distal ends and both lateral edges. There is no indication of thermal features at the site surface.

5LA8074

The site is located on a grassy plain near an unnamed arroyo. The site boundary is defined by the extent of the lithic scatter that contains forty-four pieces of debitage and seven flaked tools. The vegetation consists of prickly pear, cholla, foxtail, and various other grasses. A small chert corner-notched point (Type P35, Late Archaic to Late Prehistoric), a large corner-notched point (Type P18, Archaic), and a large stemmed point (Type P70, unknown age) indicate multiple occupations and a mixed assemblage. The remaining tools are two retouched flakes and two bifaces. Well over half (61%) of the debitage specimens are made of hornfels/basalt. The other specimens are chert (21%), argillite (14%), and quartzite (4%). Simple flakes (18), complex flakes (16), shatter (9), and biface-thinning flakes (1) make up the debitage classes. Even though the site has time diagnostic artifacts, the lack of soil deposition and features make it a poor candidate for additional work.

5LA8075

The site is located on a gently sloping east side of a rise, just east of a small, unnamed arroyo. The site also extends a bit over the crest of the rise toward the drainage. On-site vegetation includes foxtail, grama grass, low sage, yucca, prickly pear, and various wildflowers. No flaked- or ground-stone tools were identified at the surface, and no features are noted. The assemblage consists of 40 debitage specimens, including 17 simple flakes, 17 complex flakes, and six shatter. The counts for material type are hornfels/basalt (14), chert (10), argillite (7), quartzite (5), chalcedony (3), and limestone (1). A small building (approximately 5 x 5 m) is seen to the southwest, 110 m from the site datum. Some surface damage from modern vehicle tracks occurs within the site boundary. The site requires no further work.

5LA8076

This site is located on a grassy plain, 25 m west of Burke Arroyo. Overall, the site is large, but artifact density is extremely low. The site has been moderately disturbed by army maneuvers and episodic sheetwash erosion. The artifact assemblage consists of forty-eight pieces of flaking debris, two finished chert bifaces, and an argillite non-bipolar core. No diagnostic tools were located. The debitage is made of the following material types: hornfels/basalt (18), chert (13), argillite (10), coarse-grained quartzite (4), and fine-grained quartzite (3). Debitage classes

include simple flakes (25), complex flakes (16), shatter (6), and biface-thinning flakes (1). No features are noted, and the site has very little subsurface deposition. No further work is recommended.

5LA8077

The site consists of a moderate-to-sparse surface scatter of lithics located on a grassy plain, with an unnamed drainage 20 m southeast. The artifact assemblage consists of twenty-eight pieces of debitage, three flaked tools, and two ground-stone artifacts. Of the debitage, eighteen specimens are simple flakes, five are complex flakes, and five are shatter. The majority are made of hornfels/basalt (61%), with argillite (18%), quartzite (18%), and chert (4%) also represented. Chipped-stone tools include one small chert patterned biface, one hornfels/basalt retouched flake, and one hornfels/basalt non-bipolar core. The ground-stone artifacts are two complete manos. These are unmodified quartzite cobbles with light-to-moderate usage. No features were readily apparent on the ground surface, and no patterns are noted in artifact distribution. Some surface disturbance from two-track road and off-road traffic is present. Surface visibility is good, owing to sparse ground cover. No further work is recommended.

5LA8078

This site consists of a single basalt flake and an early-stage chert preform for a small projectile point. It is located on a ridge near an unnamed side drainage that flows northeast to Burke Arroyo. Surface visibility is good, with rodent disturbances and small blowouts providing visibility. No features were found on this small site, and it is not significant.

5LA8079

The site is a small lithic scatter located between two unnamed drainages that lead to Burke Arroyo. It is situated on a grassy slope, and surface visibility is good in most places. The artifacts are twenty-nine debitage specimens, and two hornfels/basalt core-tools. The debitage is largely simple flakes (14), with unmodified shatter (8) and complex flakes (7) also noted. These are made of hornfels/basalt (55%), chert (21%), argillite (17%), Polvadera Peak obsidian (3%), and quartzite (3%). No diagnostic artifacts or features were found on site, and no additional work is planned.

5LA8080

The site consists of eight scattered flakes and a biface fragment that is probably the base of a small projectile point preform. The site is located on the flat top of a large ridge. Seventy-five meters away, the northwest edge of the ridge overlooks an unnamed drainage that feeds into Burke Arroyo. Evidence for wind erosion is present, and the site is in fairly good condition. Half (4) of the flakes are made of hornfels/basalt; the remaining specimens are three argillite flakes and one chert flake. Artifact classes are three simple flakes, three pieces of shatter, and two complex flakes. No ground-stone tools or features were seen, and no further work is recommended for this small site.

5LA8081

The site consists of a sparse scatter of debitage and the midsection of a large, unknown type, silicified wood projectile point. It is located on the tip of a broad, flat ridge, overlooking the head of Burke Arroyo to the northeast and broad plains to the north and west. The vegetation cover at the site is sparse, and ground visibility is quite good. A few vehicle tracks and some wind erosion have disturbed the deposits. The flaking debris is argillite (4), hornfels/basalt (3), and quartzite (2). Five of the nine specimens are complex flakes. Three simple flakes and one piece of shatter are also noted. With no surface indications of thermal features, this small site is not a good candidate for further work.

5LA8082

The site is a sparse lithic scatter that sits on a ridge located approximately 50 m south of previously recorded site 5LA5725, and overlooks Burke Arroyo. The site also sits 175 m southwest of Rock Crossing. Vegetation is consistent with that of sparse grassland, and the site visibility is fair. Hornfels/basalt (64%), chert (18%), quartzite (9%), and quartz (9%) are the material types. Of the eleven debitage specimens, six are simple flakes, four are complex flakes, and one is shatter. One quartz non-bipolar core was recovered. Because the site is small and no diagnostic artifacts or features were found, no further work is recommended.

5LA8083

This small site covers less than one acre. Cultural materials consist of burnt bone fragments, 37 pieces of debitage, and one large, chert, thin, patterned biface. Many chert biface-thinning (8), and tool manufacture flakes (12) were found clustered in one small area and suggest at least one biface was manufactured on site. The remaining specimens are fourteen simple flakes and three pieces of shatter. Thirty-four specimens are chert, with one each for argillite, basalt, and quartzite. The site is located on a grassy slope with a small hill to the south, a small drainage on the northwest side, and Taylor Arroyo to the north and east. The site is moderately disturbed by army maneuvers, and some water erosion is seen near the small drainage. No ground-stone artifacts were recovered, and no features are noted.

5LA8084

This small site is located on a grassy slope on a small ridge that is located 200 m southwest of Taylor Arroyo. Two simple silicified wood flakes and a biface make up the artifact assemblage. The quartzite biface likely functioned as a cutting and scraping tool, with moderate usage on the steep lateral edges and light use wear on the acute distal end. The site is moderately disturbed, as evidenced by vehicle tracks. The surface visibility is good because the vegetation is sparse. Clusters of foxtail barley and prickly pear were noted, and isolated sunflowers were present throughout the site. This site is not significant.

5LA8085

The site consists of a sparse scatter of thirteen flakes, including nine simple and four complex. The flakes are predominately basalt (5), with smaller amounts of chert (3), quartzite (2), silicified wood (1), Cerro del Medio obsidian (1), and argillite (1). No tools or features were found on site. This site is located on a grassy plain that begins to slope down into Taylor Arroyo. Further work is not recommended.

5LA8086

This small site consists of three chert flakes, two basalt flakes, and one piece of basalt shatter. It is located on a plain overlooking the confluence of Taylor and Burke Arroyos. Surface visibility is about 50%. Vegetation consists of foxtail, bunchgrass, hairy grama, prickly pear, yucca, and various other grasses. Numerous other sites are present in the vicinity. This site is not significant.

5LA8087

The site lies in a floodplain just above Burke Arroyo, which is 100 m southeast. All artifacts in this small lithic scatter are debitage and are further classified as 17 simple flakes, three complex flakes, and one piece of shatter. The specimens represent five material types: hornfels/basalt (7), quartzite (5), chert (4), argillite (3), and silicified wood (2). A two-track road is seen to the south and east of the site, and some water erosion is evident. No features or diagnostic artifacts were recovered from the surface.

5LA8088

The site is a large lithic scatter situated in juniper scrubland at the northeast edge of a ridge overlooking Taylor Arroyo (1,400 m north and east). The site slopes to the northeast and sits at an elevation of 5,470 feet. The artifacts are mostly flakes, but include seven flaked tools that were scattered randomly throughout the site. The soil is thin with limestone bedrock exposed in a few tank tracks. There are a few clusterings of artifacts in the east part of the site, but overall density is low. The debitage is 31 simple flakes, 22 complex flakes, and 4 pieces of shatter. Most of the debitage specimens are basalt (23), and argillite (21), with fewer quartzite (5), chert (3), chalcedony (2), obsidian (2), and silicified wood (1) specimens represented. One piece of obsidian (5LA8088.0.2) was sourced to the Obsidian Ridge region of the Jemez Mountains of New Mexico and the other (5LA8088.0.6) to the Polvadera Peak source. Four basalt tools (two projectile points, one non-bipolar core, and one bifacial core-tool) as well as one chert biface and one chert side scraper were recovered. The projectile points are Archaic (Type P14) and Late Prehistoric (type P79) in age and indicate multiple site occupations. The biface is classified as unfinished. The side scraper exhibits moderate use wear on both lateral edges, including one that is steep in edgeview and one that is acute in edgeview. Because there are no diagnostic artifacts or features, additional research is not recommended.

5LA8089

The site is a very sparse scatter of lithic debitage and a single mano on a narrow finger that extends down from a juniper-covered ridge, out between two unnamed drainages. Although there are a few juniper trees down the slope, the area of the site itself is one of grass with yucca and low bushes. The site looks out over a drainage basin that forms the upper part of Taylor Arroyo. Eleven of the 16 flakes are hornfels/basalt, with argillite (4) and a single limestone flake also recorded. Debitage classifications are eight complex flakes, seven simple flakes, and one piece of shatter. With the lack of deposition and features, no further work is recommended.

5LA8093

The site consists of a sparse scatter of lithic artifacts on top of a small hill in the middle of a grassy plain. Seven flakes, an unmodified quartzite biface, and a single quartzite mano were recorded. The flakes are classified as four simple and three complex. Three of these are argillite, with one each for chert, basalt, quartzite, and silicified wood. Artifacts are visible mainly in the bare patches among the vegetation. No features were noted.

5LA8094

This large multicomponent site consists of a large lithic scatter, a historic brush corral (Feature 1), and a dispersed scatter of historic artifacts. The site is located on the top of a low mesa (elevation 5,425 feet) as well as on its northern slope. Surface visibility is good, owing to light vegetation that consists of juniper, galleta grass, brome grass, foxtail, and various wildflowers. There is surface damage in places due to military maneuvers as well as water erosion. Limestone bedrock is exposed throughout the site, and soil deposits are thin. The site includes one ash stain, with no observed thermally altered rock. This is likely related to modern military activity.

The historic trash scatter and brush corral are somewhat concentrated at the north end of the site. Artifacts include 18 tin cans (mainly sanitary cans and lard bucket lids), pieces of hand-hewn lumber, barbed wire, non-barbed wire, numerous wire nails, one cast iron bolt, and one draft horse linch pin. Other corrals may have been on site, but have been destroyed by military activity. A barbed-wire fence with juniper posts is on the east end of the site, near the brush corral. Numerous juniper trees have been axe-cut throughout the site area. A large wooden gate is near the southern end of the corral. Based on the artifacts and the history of the region, the historic component likely dates ca. 1900.

Table 5.3: Artifact Type by Material Group for 5LA8094.

Type	Material Type						
	Argillite	Chert	Hornfels/Basalt	Obsidian	Quartzite	**Total**	Pct.
End/Side Scraper	0	1	0	0	0	1	5.0%
Large Biface	1	2	1	0	0	4	20.0%
Utilized Flake	0	0	1	0	0	1	5.0%
Non-Bipolar Core	3	1	3	0	3	10	50.0%
Projectile Point	1	0	0	1	0	2	10.0%
Hammerstone	0	0	0	0	1	1	5.0%
Bipolar Tool	0	0	0	0	1	1	5.0%
Total	1	7	1	3	1	20	100.0%
Pct.	5.0%	35.0%	5.0%	15.0%	5.0%	100.0%	

The unexpected size of the flaking debris assemblage required a sampling of 152 pieces of debitage. The artifact classes are 73 complex flakes, 70 simple flakes, six pieces of shatter, two bifacial-thinning flakes, and one bipolar core-reduction flake. Hornfels/basalt (59%) is the dominant material type, with lesser amounts of argillite (19%), chert (8%), quartzite (8%), silicified wood (5%), and Polvadera Peak obsidian (1%) represented. Thirty-nine percent of the flakes show some degree of dorsal cortex.

There are seven artifact types represented in the flaked tool assemblage. These are comprised of ten non-bipolar cores, four unfinished bifaces, two large corner-notched (Type P26, and one unknown type) projectile points, one end/side scraper, one utilized flake, one hammerstone/core, and one bipolar tool. Table 5.3 shows the material types for the flaked tools.

Thirty-one ground stone specimens were recorded, including twenty-one manos (five whole, sixteen fragments) and ten slab metate fragments. Other than one granite mano, all are made of sandstone. This is an interesting site, with an abundance of material types, diagnostic projectile points, and a variety of ground stone. With a lack of features and no soil deposition, it does not offer any potential for additional research.

5LA8095

The site sits on the edge of a ridge overlooking Taylor Arroyo (300 m) to the north. Based on artifacts present on site, raw material reduction, tool usage, and food processing are inferred. Vegetation includes juniper, saltbush, goldenrod, needle and thread grass, yucca, thistle, snakeweed, scarlet globe mallow, foxtail, and purple threeawn. The site has been deflated and disturbed by military activity, and very little cultural deposition remains evident at the site.

The artifact assemblage consists of eight flakes, three basin metate fragments, one mano, and one crude basalt biface. Of the flakes, seven are basalt, and one is quartzite. Five are complex flakes, and three are classified as simple. The site is not significant.

5LA8096

The site is a scatter of historic debris around a single stone and wood foundation and the remnants of a wood and barbed-wire corral. It is located on a gently southeast-sloping plain 520 m south of Taylor Arroyo. A single juniper tree stands at the northwest corner of the structure (Feature 1), which measures 6.5 m north-south and 4 m east-west. The foundation consists of scattered, modified limestone blocks and four pieces of milled lumber that were stacked on the east side. The structure was likely dismantled, and the building materials used elsewhere. Associated artifacts include numerous tin can fragments (chiefly tobacco), milled lumber, one stove pipe segment, wire nails, hog wire, barbed wire, bottle and window glass, one cut nail, and a metal spoon. Because the site lacks structural integrity and little potential for buried deposits is seen, no further work is warranted.

5LA8097

The site is a sparse scatter of lithics and two manos. The site is located in a floodplain near the convergence of two arroyos: Taylor Arroyo and an unnamed drainage. As evidenced by the high number of large surface gravels and the large size of the artifacts, the site has been heavily eroded and deflated. No tools were recovered. The flaking debris consists of seven flakes (five complex, two simple). Three flakes are chalcedony, two are chert, and two are argillite. This small site is not significant.

5LA8098

The site is a small scatter of lithics toward the end slope of a ridge that is the first terrace of Taylor Arroyo. Erosion from episodic sheetwash activity and overbank/flooding episodes from the arroyo have deflated the site. No thermal features are noted at the surface. However, the western portion of the site has a disperse scatter of thermally altered rocks which are likely the remains of one or more hearths that have eroded and scattered downhill. Artifacts include 31 pieces of flaking debris, two slab metate fragments, two mano fragments, a basin metate fragment, and an argillite non-bipolar core. Nearly all the flakes are argillite (14) and hornfels/basalt (14). Quartzite (2) and chert (1) comprise the remaining three specimens. No additional research is recommended.

5LA8099

This is a relatively sparse lithic scatter that is located just below the rim of a small ridge, 400 m southwest of Taylor Arroyo. The artifact assemblage consists of debitage, cores, flaked tools, projectile points, and ground-stone artifacts. The majority of the artifacts are noted along a shallow arroyo which cuts through the site. Material types noted for the debitage specimens are hornfels/basalt (20), argillite (11), and chert (5). The artifact classes include 17 complex flakes, 12 simple flakes, 5 pieces of shatter, and 2 biface-thinning flakes. The tools are five non-bipolar cores (two argillite, two chert, one hornfels/basalt), three manos, one obsidian (Type P85, Polvadera Peak source) and one quartzite projectile point (unknown type), one basin metate fragment, and one utilized flake made of Alibates dolomite. Food processing, lithic reduction, and tool-manufacturing activities occurred on site. Based on the obsidian projectile point, the

site likely dates to the Late Prehistoric Stage. The two nonlocal materials (obsidian and Alibates) suggest that group movement or some trading occurred with the inhabitants of the site. The site has suffered erosion from runoff and slope wash. No additional research is recommended.

5LA8100

The site sits on a ridge between two unnamed side drainages of Taylor Arroyo. Three basalt flakes and one limestone flake, as well as two projectile points, are noted. The small corner-notched point (Type P59) is made of basalt and dates to the Late Prehistoric stage. The large stemmed argillite point (Type P9) is Archaic. No evidence for features was encountered, though surface visibility was good. The site is not significant.

5LA8101

The site is located on a hill overlooking the confluence of two unnamed drainages of Taylor Arroyo at an elevation of 5,340 ft. A heavy concentration of lithics was observed on the south-facing slope of the site and includes debitage, a preform, and one large bifacial core-tool. Debitage classes are 18 simple flakes, 13 complex flakes, and three pieces of shatter. This suggests that the site functioned as a lithic reduction area. Hornfels/basalt (61%) is the dominant material type, with argillite (27%), chert (6%), quartzite (3%), and limestone (3%) also observed. The preform is made of chalcedony, and the core-tool is basalt. The site needs no further work.

5LA8102

The site is located on the grassy western slope of a low ridge. Vegetation for the site and surrounding area consists of squirrel tail grass, low sage, rice grass, and juniper. The surface visibility is good, due to the sparsely distributed vegetation and exposed areas of soil. Artifact density is low and dispersed. The material types for the 12 flakes include quartzite (50%), hornfels/basalt (33%), and fine-grained quartzite (17%). Eight specimens are classified as simple flakes, and four are complex flakes. A Late Prehistoric projectile point (Type P80) made of chert was also recovered.

5LA8103

The site is a low-density scatter of debitage (20), that includes specimens of eight simple flakes, eight complex flakes, and four shatter. The materials are hornfels/basalt (75%), argillite (10%), chert (5%), quartzite (5%), and limestone (5%). There were no diagnostic artifacts recovered. The site is located on the gentle slope between low ridges near Taylor Arroyo, quite close to the actual drainage. The site is also low enough in the drainage basin to be very sheltered. Visibility in the grassland vegetation here is quite good and disturbance is low, although it is likely that this area is susceptible to slope wash. The site does not have potential for additional research.

5LA8105

The site lies on the side of an unnamed drainage that is a tributary of Van Bremer Arroyo. The site consists of two flakes (argillite and basalt) and two hearths (Features 1 and 2) that are eroding out of the cutbank of the drainage. Charcoal flecks can be seen in Feature 2. The hearths appear to have been once covered by 40 cm of deposition. The remains of other hearths may be present since there is a clustering of several pieces of thermally altered sandstone on site. Eroded areas, and particularly near the feature, were examined for the presence of additional artifacts, none were found. Based on the small size of the site and the heavy erosion, no further work is recommended.

5LA8106

This site is a sparse scatter of debitage (nine simple flakes, eight complex flakes, and one piece of shatter) on a flat plain, located next to a very shallow drainage that eventually feeds into Taylor Arroyo. The drainage is nothing more than a shallow gully, and the site extends to its edge. The site is in the middle of a broad plain with no nearby topographic relief of significance. The vegetation, consisting of galleta grass, foxtail, sunflower, thistle, and cholla, is sparse. There is some disturbance by army maneuvers, but it is not heavy. The material types are hornfels/basalt (12), argillite (3), and quartzite (3). No thermal features or diagnostic artifacts are noted. This site is not significant.

5LA8107

The site is positioned on the east slope on an unnamed drainage that is a tributary of Van Bremer Arroyo, located to the south. Visibility is good and vegetation is somewhat sparse, consisting of cholla, yucca, needle and thread grass, foxtail, and rabbit brush. A two-track road on the east edge of the site is the prime human disturbance. Wind and water are the natural disturbances. Several flakes and one small side-notched projectile point (Type P83) were observed. The projectile point is made of argillite and is Late Prehistoric. Utilized materials consist of hornfels/basalt (5), fine-grained quartzite (3), argillite (2), and chert (1). Eight of the eleven flakes were classified as complex, and three are simple. Additional research is not warranted.

5LA8108

The site lies on the slope of a ridge next to an unnamed arroyo that is a northern tributary of Van Bremer Arroyo. Some scattered sandstone, which appears to be thermally altered, is scattered at the south of the site, but no clear hearth features are present. Unlike most sites in the area, this one has an unusually high ratio (1:2) of tools (4) to flakes (8). The flake material types are hornfels/basalt (6), and one each of limestone and argillite. Of the flaked tools, the projectile point and the retouched flake are made of argillite. The unfinished biface and the bifacial core-tool are quartzite. The large stemmed projectile point is Archaic in age and is typed in Anderson's (1989) classification as a P20. This site is insignificant and not likely to contain buried cultural remains.

5LA8109

The site is a lithic scatter located at the base of a small hill. Lithic artifacts recovered at the site consist of nineteen pieces of debitage, three non-bipolar cores, two projectile points, and a large bifacial core-tool. Of the flakes, nine are hornfels/basalt, seven are argillite, two are fine-grained quartzite, and one is coarse-grained quartzite. Nearly half were classified as simple flakes (9), with complex flakes (7), shatter (2), and biface-thinning flakes (1) also seen. The projectile points are fine-grained quartzite (Type P48) and basalt (unknown type), and likely date to the Late Prehistoric Stage. The cores are basalt (2) and argillite. The core-tool is coarse-grained quartzite. Because this is a small site with no ground-stone artifacts or features, additional research is not recommended.

5LA8110

The site consists of one basalt flake and one silicified wood Late Prehistoric projectile point (Type P58), which is located on a gentle slope coming off the base of a ridge to the west. It is in an area of juniper scrub, and the site itself is characterized by a few clumps of needle and thread grass and yucca. Ground visibility is 90%, but the lack of ground cover has led to some localized slope wash. The site overlooks a drainage that ultimately runs into Van Bremer Arroyo.

5LA8213

This site is located on a grassy slope, with a ridge to the southwest and the junction of Taylor Arroyo and an unnamed drainage to the northeast. Artifact density is very low, and artifacts are widespread on this half-acre site. The artifacts consist of eight basalt flakes, three argillite flakes, one quartzite flake, and one mano fragment. Little potential for intact, subsurface, cultural deposits remains, and the site shows considerable erosion due to episodic sheetwash activity. No features were encountered, and no diagnostics were found. The site is not significant.

5LA8214

The site is highly deflated and is located on a small ridge between two intermittent drainages. Artifacts represented include debitage, flaked tools, and ground-stone tools. Ninety-three percent of the debitage specimens are complex (26) and simple (25) flakes, with formal biface-thinning flakes (2) and shatter (2) making up the remainder. The material types are 75% argillite, 18% hornfels/basalt, 6% chert, and 2% quartzite. All flaked tools are made of basalt and are classified as two unfinished bifaces and one non-bipolar core. A schist mano fragment with edge wear was collected, and a sandstone metate fragment was recorded. Surface visibility is good (roughly 75%), and only 10 cm of deposition is present. Vegetation includes juniper, cholla, low sage, saltbush, yucca, prickly pear, needle and thread grass, foxtail, and various wildflowers. No additional research is recommended for this lithic scatter.

5LA8215

The site measures 23 by 16 m and is composed of one eroded hearth feature (Feature 1), seven flakes, three ground-stone artifacts, and a non-bipolar core. The site is located on the northern slope of a small ridge, which sits in a large arroyo cut drainage. Five of the flakes were classified as complex; two are simple. The flakes are made of basalt (3), quartzite (2), chert (1), and argillite (1). Two sandstone manos and one basalt celt/edge-ground cobble are noted. The celt has two long facets on the lateral edges, and the two largest surfaces (ventral and dorsal faces) exhibit striations that are due to heavy polishing rather than use. Both the dorsal and proximal ends were initially ground to the desired shape, then used as a battering tool. The non-bipolar core is argillite. Overall, the site and Feature 1 are deflated, with artifacts and fire-cracked rock eroding downhill. There are also pieces of tabular sandstone fire-cracked rock scattered randomly across the site surface. To the south, on the crest of the ridge, it is possible that there are intact subsurface deposits. Additional research is not warranted for this site.

5LA8216

This sparse lithic scatter sits on a slightly sloped terrace, surrounded by ridges, and is near the juncture of MSR3 and MSR4 at the Rock Crossing landmark. The artifacts are visible in the open patches of ground among the low- to moderate-density vegetation. Field Specimens 1 (a utilized chert flake) and 2 (a quartzite biface fragment) were collected. Surface flaking debris is made of basalt (25), coarse-grained quartzite (10), chert (8), fine-grained quartzite (7), Black Forest silicified wood (2), and quartz (1), which can be further classified as 30 simple flakes, 13 complex flakes, 8 biface-thinning flakes, and 2 pieces of shatter. No features are noted, though thermally altered pieces of tabular sandstone can be seen scattered randomly across the site surface. This and the recent animal burrowing activity indicate that the site has been moderately disturbed. Additional research is not warranted for this site.

5LA8217

This large multicomponent site consists of a large lithic scatter, a historic brush corral (Feature 1), a milled lumber structure (Feature 2), and a scatter of historic artifacts. The site is located on the top of a ridge (elevation 5,550 feet) that overlooks the plains to the south. Surface visibility is good, owing to scattered vegetation that consists of juniper, piñon pine, cheatgrass, needle and thread grass, goldenrod, foxtail, and various wildflowers. The site has experienced slight erosion due to military maneuvers and sheetwash flooding. Most of the site is exposed bedrock, and artifacts are seen on the surface. Soil depth is only 10 cm, and no thermally altered rock concentrations were seen.

The historic trash scatter, brush corral, and lumber structure are located at the east edge of the site, with the trash scatter continuing north and west along the ridge line. The artifact scatter, consisting mainly of tin cans, also includes amethyst bottle glass, numerous wire nails, milled lumber, pieces of sheet metal, plain wire fragments, and one case knife. The remnant of a barbed-wire fence is visible along the north edge of the corral, running toward the structure. Numerous trees on the site have been cut down by axe. Feature 1 is roughly oval in shape and measures 48 m north-south by 28 m east-west. The support system is juniper logs and milled

lumber wrapped with wire. Feature 2 measures 4 m north-south by 3 m east-west. It is a stacked foundation composed of juniper tree logs and milled lumber held together by wire with sheet metal on the interior. Based on the artifacts and the history of the region, the historic component likely dates ca. 1900 - 1930.

Table 5.4: Artifact Type by Material Group for 5LA8217.

	Material Type									
Type	Alibates	Argillite	Chert	Hornfels/Basalt	Obsidian	Quartzite	Schist	Sandstone	**Total**	Pct.
Small Proj. Point	0	1	0	0	1	0	0	0	2	2.4%
Large Proj. Point	0	1	0	0	0	0	0	0	1	1.2%
Biface	1	2	3	0	1	1	0	0	8	9.8%
Drill	0	1	0	0	0	0	0	0	1	1.2%
End/Side Scraper	0	1	0	0	0	0	0	0	1	1.2%
Side Scraper	0	0	1	0	0	0	0	0	1	1.2%
Retouched Flakes	0	0	1	1	1	0	0	0	3	3.7%
Utilized Flakes	0	0	0	0	2	1	0	0	3	3.7%
Non Bipolar Cores	0	4	0	10	0	3	0	0	17	20.7%
Battered Core-tools	0	0	0	5	0	3	1	0	9	11.0%
Basin Metate	0	0	0	0	0	0	0	2	2	2.4%
Edge-Ground Cobble	0	0	0	0	0	0	0	1	1	1.2%
Mano	0	0	0	0	0	5	0	22	27	32.9%
Slab Metate	0	0	0	0	0	0	0	5	5	6.1%
Unknown Ground Stone	0	0	0	0	0	0	0	1	1	1.2%
Total	1	10	5	16	5	13	1	31	82	100.0%
Pct.	0.0122	12.2%	6.1%	19.5%	6.1%	15.9%	1.2%	37.8%	100.0%	

The unexpected size of the flaking debris assemblage required a sampling of 150 pieces of debitage. The artifact classes are 64 complex flakes, 60 simple flakes, 23 pieces of shatter, and three bifacial-thinning flakes. Basalt (61%) is the dominant material type, with lesser amounts of argillite (23%), quartzite (9%), chert (7%), and silicified wood (1%) represented. Thirty-eight percent of the flakes show some degree of dorsal cortex, and most of these are hornfels/basalt (40).

There are ten artifact types represented in the flaked tool assemblage. These types are comprised of seventeen non-bipolar cores, nine large core/hammering tools, eight bifaces, three utilized flakes, three retouched flakes, two small projectile points, a large projectile point, two scrapers, and a drill. The argillite projectile point (Type P58) dates to the Late Prehistoric stage, and both the obsidian (Type P35) and basalt (Type P19) points date to the Late Archaic. Thirty-six ground-stone specimens were recorded, including twenty-seven manos, five slab metate fragments, two basin metate fragments, an edge-ground mano fragment, and an unidentifiable interior ground-stone piece. Other than one mano specimen, all the ground-stone tools are broken. Table 5.4 shows the material types for the flaked- and ground-stone tools.

This is an interesting site with an abundance of material types, diagnostic projectile points, and a variety of ground stone. It is unknown if the abundance of tools correlates directly to the presence of piñon. The obsidian specimens appear to be of the Polvadera Peak and Obsidian

Ridge varieties from central New Mexico, and at least one biface is made of Alibates dolomite. With a lack of thermal features and soil deposition, this site does not offer any potential for additional research.

5LA8218

The site sits on a small finger ridge that forms a shelf above and north of 5LA8217. It is a small scatter of purple quartzite flakes that are from one parent piece and likely represent a single reduction episode. The flake classifications are 15 simple flakes, 13 complex flakes, and three biface-thinning flakes. Sixteen of the 31 flakes show dorsal cortex. Field Specimens 1 and 2 (cores) were recovered from opposite ends of the site and away from the flake concentration, and are made of basalt and quartzite. The soil is comprised of eroded bedrock. Additional research is not needed on this small site.

5LA8219

The site is a sparse lithic scatter located on the erosional fan, downslope from site 5LA8217. The artifacts are visible in the open, gravelly patches among the high- to moderate-density vegetation. The surface flaking debris is primarily made of hornfels/basalt (81%), with argillite (10%), chert (2%), Polvadera Peak obsidian (2%), quartz (2%), and quartzite (2%) also seen. The flaked tools include two quartzite projectile points (Types P3 and P79), two retouched argillite flakes, one utilized quartzite flake, one Alibates dolomite scraper, one chert biface, and one hornfels/basalt core. The small projectile point (FS 3) is Late Prehistoric in age, and the biface fragment appears to be the base of a Paleoindian projectile. All ground-stone artifacts are broken and are classified as four manos (two granite, two sandstone), one sandstone metate fragment, and one unidentifiable interior fragment. Because this site sits directly below 5LA8217 and may be the product of erosional wash, no further work is recommended.

5LA8220

This site is a small, dispersed scatter of 12 pieces of debitage and a chert projectile point (Type P35, dated from the Late Archaic to Late Prehistoric). It is located at the base of a small mesa that slopes four degrees to the southwest. Of the debitage, specimens include seven simple flakes, four complex flakes, and one shatter. Nine specimens are hornfels/basalt, with one each of Cerro del Medio obsidian, quartzite, and silicified wood. On-site vegetation is goldenrod, rabbit bush, juniper, low sage, purple threeawn, and needle and thread grass. Surface soils are silty loam with intermixed gravel, and are the result of wind and water erosion. No other tools or features were located, and this site is not significant.

5LA8221

The site is located on a small ridge that is covered with juniper and piñon trees, and on lobes to the south. The site is not heavily disturbed, but there are signs of erosional and army disturbance. The surface scatter consists of thirty-three pieces of debitage, three manos (two sandstone, one schist), a basalt core-tool, and a sandstone slab metate fragment. Flaking debris, which was analyzed on site, consists of sixteen simple flakes, thirteen complex flakes, three

pieces of shatter, and a biface-thinning flake. Hornfels/basalt (79%), quartzite (12%), argillite (3%), quartz (3%), and silicified wood (3%) are the material types. One piece of pottery (FS 1) was collected; however, analysis shows that this is actually a highly fired piece of adobe. Because the site is small and highly deflated, with low artifact density and little soil deposition, no further work is recommended.

5LA8223

The site is located between two drainages on a ridge northeast of, and overlooking, a valley. The terrain around the site slopes gently to the south and steeply to the north. This small site consists of a natural quartzite edge-ground cobble fragment; one quartzite mano fragment, one noncortical, silicified wood flake; and one retouched basalt flake. Field Specimen 2 (edge-ground cobble) is triangular in planview, and has heavy edge grinding and light-to-moderate wear elsewhere. The site has been highly disturbed by wind erosion and exhibits roughly 60% visibility. No thermal features are noted, and no additional work is planned.

5LA8224

Site 5LA8224 is located on a large low ridge and is bisected by an east-to-west trending drainage. It measures approximately 250 m north to south, but is considerably constricted east to west. This site is comprised of a historic trash scatter (Feature 1) that is located within the boundaries of an extensive prehistoric lithic scatter. Site visibility is good, with minimal ground cover. Vegetation includes cholla, juniper, foxtail, needle and thread grass, yucca, and prickly pear. The site disturbances range from military activity, a two-track road, a drainage, and wind.

Historic artifacts within Feature 1 include solder-top tin cans; tea and tobacco tins; purple, aqua, blue, and green glass; stoneware crockery sherds; and one piece of masonry brick. The feature is on a juniper-covered terrace in the north half of the site. Several trees and stumps appear to have been sawed or cut down, suggesting that Feature 1 was part of a logging encampment. Based on the amethyst glass and the solder-sealed cans, the historic component dates to the early 1900s.

A diverse amount of artifacts were encountered, including forty-one pieces of debitage, seven flaked tools, and five ground-stone artifacts. Raw materials noted for debitage are hornfels/basalt (54%), argillite (15%), quartzite (15%), chert (9%), silicified wood (5%), and nonlocal obsidian (2%). The three debitage classes are complex flakes (23), simple flakes (14), and shatter (4). Chipped-stone tools include two argillite projectile points (Late Prehistoric, Type P83), three utilized flakes (argillite, fine-grained quartzite, and obsidian), one unfinished Alibates dolomite biface, and one quartzite non-bipolar core. Two manos, one edge-ground cobble, one basin metate fragment, and one slab metate fragment comprise the ground-stone assemblage.

No prehistoric features were seen at the surface, and the site shows very little soil deposition. This site is not believed to be significant.

5LA8225

This small site consists of three basalt flakes (two simple, one complex), one complex argillite flake, and a Late Prehistoric projectile point (Type P58) located on the northwest corner of a small juniper-covered ridge. A large ridge lies several hundred m to the west, and the land slopes gently from the base of that ridge to the knoll, dropping sharply on the east side down to the rolling plains around the drainages that feed Van Bremer Arroyo. The vegetation is quite sparse, leading to excellent visibility (90%). The soil is fairly rocky, especially farther onto the knoll, and bedrock sits roughly 40 cm below the modern ground surface. Additional work is not needed.

5LA8226

The site is located on a small drainage at the end of a small, high mesa. Surface visibility is good in terms of the lack of vegetation; however, an extensive limestone outcrop covers the mesa. Vegetation consists of piñon, juniper, low sage, and needle and thread grass. Artifacts include a quartzite projectile point (type unknown), a retouched flake (basalt), a hammerstone (quartz), and three metate fragments (sandstone). The remaining artifacts are miscellaneous debitage, including hornfels/basalt (37%), quartzite (24%), limestone (13%), argillite (13%), and chert (13%). Four simple flakes, two complex flakes, and two pieces of shatter make up the artifact classes. Artifact density is low and rather scattered; tool density is higher near the datum. No further work is recommended for this featureless site.

5LA8227

This small site is located on the east side of a low ridge and has both a prehistoric and historic component. Vegetation that is present consists of juniper, foxtail, yucca, salt and rabbit brush, and sunflower. Intense historic disturbance, military disturbance, and wind and water erosion are the agents that have led to open patches in the vegetation.

A historic corral (Feature 1) constructed of fallen trees lies to the immediate east of the lithic scatter. Made of interwoven, horizontal juniper trunks and branches, it is vaguely semicircular in planview and is open to the east. A rough line of much lower, interwoven branches closes the east end, but only rises to a height of 30 cm. The main wall of the corral is preserved to a height of ca. 1 m, suggesting that it enclosed sheep and not cattle. A low arm of the corral extending to the north looks like it acted as a chute for herding livestock into the corral. Overall, Feature 1 measures 32 by 16 m. A solder-dot, processed food can was recovered near the feature.

The lithic assemblage is concentrated on the north and west edge of the site and is composed of two quartzite shatter specimens, one complex argillite flake, one simple basalt flake, and a basalt core. Prehistoric features and diagnostic artifacts were not found.

5LA8228

The site is located on the slope of a small ridge that is covered by juniper scrub and overlooks a grassy plain to the northwest. The vegetation is sparse, exposing fine, sandy soil. Erosion and army maneuvers have moderately disturbed the site. Artifacts include two fine-grained quartzite utilized flakes, and debitage made of basalt (11), chert (5), quartzite (4), and argillite (2). Twenty of the debitage specimens are flakes (11 simple, 9 complex), and two are shatter. Additional research is not recommended for this small site.

5LA8229

The site is located on a grassy plain near the edge of an unnamed arroyo, south-southeast of Burson Camp. A two-track road passes to the north. Vegetation is sparse, leading to good surface visibility. Erosional disturbance is light, and there is evidence of army maneuvers (vehicle tracks, wire). The site is a small, fairly concentrated, historic trash scatter composed primarily of bottle glass, tobacco and food can fragments, and stone ware. Other recovered artifacts include barbed wire, riveted leather, the top of a pencil, metal strapping, one barrel hoop, smooth wire, and unmodified juniper wood. The predominance of food and tobacco cans and the relative lack of china, tableware, stoneware, or construction materials suggest that this was a campsite or other temporary activity area. The Owens ring bottles are post-1903; crimped cans are post-1920; solder-top cans are pre-1903. The majority of the cans are crimped; the lack of rubber and plastic suggests the end date. A complete sandstone metate was recovered.

5LA8230

This small site is located on the eastern slope of an unnamed drainage directly west of a three-way intersection of two-track roads. Artifact density is low, and specimens are randomly scattered throughout the site boundary. Two basalt cores and a few flakes of basalt (5), chalcedony (1), chert (1), and quartzite (1) were encountered along with a small, corner-notched Late Prehistoric projectile point made of fine-grained quartzite. The site visibility is excellent, as the vegetation consisting of low sage, galleta grass, rabbit brush, yucca, and juniper is sparse. No obvious historic or military disturbance is observed. This site is not significant.

5LA8231

Site 5LA8231 represents a large, multicomponent lithic scatter with a historic trash dump. The site sits mostly in an area of juniper scrub that forms two low rises above the junction of two unnamed drainages just to the southeast of Burson Camp. The site slopes rather gently to the southwest and has been heavily disturbed by erosion. Light brown, sandy silt covers the surface, along with needle and thread grass, purple threeawn, yucca, juniper, low sage, cholla, prickly pear, and goldenrod. Artifacts analyzed in the field include debitage, flaked tools, and ground-stone tools.

The historic component of the site is quite small, consisting of a few cans and other objects concentrated in the east portion of the site. Nearly all the historic artifacts are in a can scatter in the east-central part of the site. This area could be more recent than 50 years old.

Table 5.5: Artifact Type by Material Group for 5LA8231.

	Material Type									
Type	Argillite	Chert	Hornfels/Basalt	Obsidian	Quartzite	Silicified Wood	Granite	Sandstone	Total	Pct.
Small Proj. Point	0	2	0	0	0	0	0	0	2	2.9%
Large Proj. Point	1	1	2	0	0	0	0	0	4	5.9%
Biface	2	3	0	0	5	1	0	0	11	16.2%
Drill	0	0	1	0	0	0	0	0	1	1.5%
End Scraper	1	0	0	0	0	0	0	0	1	1.5%
Perforator	0	1	0	0	0	0	0	0	1	1.5%
Utilized Flakes	2	2	1	2	0	1	0	0	8	11.8%
Bifacial Core-Tool	0	1	1	0	0	1	0	0	3	4.4%
Non Bipolar Cores	0	3	2	0	0	0	0	0	5	7.4%
Battered Core-Tools	0	0	2	0	0	0	0	0	2	2.9%
Shaft Straightener	0	0	0	0	0	0	0	1	1	1.5%
Basin Metate	0	0	0	0	0	0	0	1	1	1.5%
Mano	0	0	0	0	1	0	1	12	14	20.6%
Slab Metate	0	0	0	0	0	0	0	14	14	20.6%
Total	6	13	9	2	6	3	1	28	68	100.0%
Pct.	8.8%	19.1%	13.2%	2.9%	8.8%	4.4%	1.5%	41.2%	100.0%	

Noted in the 150 debitage specimens sampled are 66 simple flakes, 54 complex flakes, 16 pieces of shatter, and 14 biface-thinning flakes. The majority are made of hornfels/basalt (53%), argillite (15%), and chert (15%), with lesser amounts of other materials, including coarse-grained quartzite (10%), fine-grained quartzite (3%), quartz (2%), obsidian (1%), and silicified wood (1%). The presence of cortex on 46% of the debitage indicates these materials were recovered from nodules or waterworn sources. Other than one obsidian specimen, all materials are presumed to be locally available. This piece of obsidian debitage is from the Polvadera Peak source locale.

Table 5.5 summarizes the various material types for the flaked- and ground-stone tools. The flaked tool assemblage includes ten artifact classes. Specimens include eleven bifaces, eight utilized flakes, five non-bipolar cores, four large projectile points, three bifacial core-tools, two small projectile points, two battered core-tools, two perforating tools, and one end scraper. Of the bifaces, four are complete and seven are broken. Eight are classified as unfinished, and three show some use wear on one acute edge. The utilized flakes are five complete and three broken specimens. Half show use wear on one or more acute edges, and four show use wear on steep edges. The Anderson (1989) classifications for the projectile points are two P12 (Middle Archaic to Late Prehistoric) specimens, one P18 (Archaic) specimen, one P52 (Late Prehistoric) specimen, and one unidentifiable fragment. The ground-stone assemblage consists of mostly mano (13) and metate fragments (15), with one complete shaft straightener, and one complete mano.

Overall, the artifact density is low for the site, with dense pockets of artifacts around FS 49 and FS 3. No features are identified at the site. It is possible that the site is the product of many occupations, and is more horizontally rather than vertically stratified. This site is not a good candidate for additional work, though its relationship to sites 5LA8254, 5LA8232, and 5LA8230 is interesting.

5LA8232

This site is located at the top of a small ridge with two unnamed drainages and Taylor Arroyo, 250 m to the southwest. It is a small cluster of lithic artifacts consisting of six flakes, three metate fragments, and two mano fragments, along with a chert point preform (Type P49), an argillite side scraper, a utilized quartzite flake, and a basalt core. Of the flakes, two are basalt, two are quartzite, one specimen is chert, and one is Polvadera Peak obsidian. Half are classified as simple flakes and half are complex flakes. Both the side scraper and utilized flake show heavy use wear on one steep, lateral edge. Because this is a small site with no diagnostic artifacts or features, additional research is not recommended.

5LA8233

The site is a lithic scatter situated on the slope north of the northernmost side drainage of Taylor Arroyo. It is located 300 m east of site 5LA8222. The soil is light-brown, silty loam in places, and grades to a higher sand content farther upslope. A two-track road cuts along the western boundary, running approximately north-south. The vegetative community is sparse grassland and includes rabbitbrush, prickly pear, yucca, foxtail, juniper, saltbush, and goldenrod. One slab metate fragment (FS 1) is recorded along with eleven pieces of debitage, which are made of basalt (7), argillite (2), and Black Forest silicified wood (2). The source for this nonlocal material is from the Palmer Divide area, approximately 120 miles northwest. Nine of the eleven specimens are flakes (five simple; three complex; one biface-thinning), and two are shatter. This site is similar to other small sites in the region and does not warrant additional work.

5LA8234

The site is located on a ridge/shelf overlooking a branch of Taylor Arroyo to the south. The surface is obscured in some areas by clusters of rabbitbrush, saltbush, low sage, and a small scatter of other grasses and brushes; 100 m north, juniper and piñon trees are abundant. The site has good ground visibility and is in good condition, despite light erosion. Artifacts on the site are flaking debris and a small sample of tools, including a projectile point fragment made of fine-grained quartzite, a basalt core-tool, a chert end scraper, a chert biface, and two utilized flakes (one basalt, one silicified wood). Artifacts also include a metate/lapstone, two complete manos, and a slab metate fragment. One mano is made on an unmodified quartzite cobble; all other ground stone is sandstone. The overall size of the projectile point fragment suggests an Archaic occupation, though the point cannot be confidently typed. No features were identified.

5LA8235

The site runs along a ridge and slope about 80 m from an unnamed (35 ft deep) side drainage of Taylor Arroyo. Eolian deposition is occurring in some parts and water erosion in others, leaving poorly consolidated, well-rounded sand at the surface. Surface visibility is good because vegetation is sparse. The site is heavily disturbed by military activity, since many ruts and tracks are visible. Primarily, debitage is present, but ground-stone and flaked tools were also recorded. Over half (31) of the debitage specimens (52) are simple flakes, with ten complex flakes, nine pieces of shatter, and two biface-thinning flakes also recorded. A selection preference is seen for hornfels/basalt (80%), with the remaining materials argillite (10%), quartzite (4%), quartz (4%), and silicified wood (2%). Of the eight flaked tools, two are large basalt core-tools, two are basalt cores, and two are biface fragments (one chert, one argillite); one quartzite uniface and one utilized chert flake were also seen. The ground-stone tools are eight manos, including four granite, three sandstone, and one quartzite. Only one mano is whole and displays battering on one end. No additional work is needed at this site.

5LA8236

Site 5LA8236 is a small concentration of lithics located in a blowout area on a slope that sits next to a side drainage flowing into Taylor Arroyo. The vegetation community is sparse grassland, and surface visibility is good (60%). Soil within the blowout consists of eolian sand, with intermixed limestone and shale gravel throughout. Possible intact deposits could be located near the crest of the ridge, 20 m south of the site. Lithic material on site consists chiefly of argillite, with one chert specimen recorded. The artifacts are nine simple flakes, five complex flakes, and the end fragment (FS 1) of a large, unmodified argillite biface. Additional work is not recommended.

5LA8237

The site is eroding out of a sandy dune area near the crest of a hill that is located between two unnamed drainages of Taylor Arroyo: one to the north and the other to the south. Surface visibility is good, owing to sparse vegetation. Some disturbance in the form of tire tracks is evident. Field Specimen 1 is a basalt core. Seven complex flakes make up the remainder of the assemblage and are made of argillite (4), basalt (2), and chert (1). No features are present, but small pieces of tabular, thermally altered rock are scattered throughout the site area. This small site is not significant.

5LA8238

The site sits on a low ridge that forms a bench below (south and east) the ridge, containing site 5LA8217. The site is also north of an unnamed side drainage that runs into Taylor Arroyo, 180 m south. The site appears to be deflated, owing to water erosion. Only large artifacts are visible at the surface. Tools recovered at the surface are FS 1, an edge-ground sandstone mano (collected); and FS 2, an unmodified, quartzite cobble mano. Four large flakes are identified and made of basalt, argillite, chert, and quartzite. No features were found, though sparse vegetation

creates good surface visibility. The soil contains high amounts of bedrock gravel, and is otherwise brown and silty. Additional work is not recommended for this small site.

5LA8239

Site 5LA8239 is a sparse scatter of lithics and ground stone located on a terrace below 5LA5683, approximately 125 m west of a spring area along Taylor Arroyo. The only surface disturbance is from heavy sheetwash activity, which has resulted in highly eroded areas containing only large artifacts that have not washed away.

Fifty-four pieces of debitage, 13 flaked tools, and 12 ground-stone artifacts are noted at the surface. Debitage classes identified are simple flakes (26), complex flakes (26), and shatter (2). The majority of the material is basalt (69%), with lesser amounts of argillite (15%), chert (7%), quartzite (7%), and silicified wood (2%) seen. Two core-rejuvenation flakes are noted and suggest some cores/raw materials were exploited to exhaustion. The flaked tool assemblage is large in relation to other sites in this portion of the Taylor Arroyo Basin. The tools are six retouched or utilized flakes, two non-bipolar cores, two scrapers, two projectile points, and one multifunctional core-tool. Of the flake tools, two are chert, two are basalt, one is argillite, and one is quartzite. Two display heavy usage on one or more edges, two exhibit light usage, and two are freshly refurbished with no apparent use wear. Both cores and the core-tool are basalt. In the remaining tools, the side scraper is chert, the combination end/side scraper is silicified wood, the small Late Prehistoric projectile point (Type P66) is quartzite, and the large Archaic point (Type P10) is argillite. The recorded ground stone consists of four mano fragments, three slab metate fragments, three mano fragments, one complete basin metate, and one basin metate fragment. Other than four granite manos, all ground stone is made from locally available sandstone. No thermal features were seen, and this small site is not considered to have integrity.

5LA8240

The site lies in a saddle between two large mesas at the edge of the Big Arroyo Hills. Surface visibility is 50%, and bedrock is eroding out throughout the site. The vegetation community on site and in the surrounding area is juniper scrub. Artifacts recorded on this small site are debitage, ground stone, and cores. The debitage is hornfels/basalt (63%), argillite (24%), quartzite (10%), and chert (3%). The debitage classes are composed of 26 simple flakes, 22 complex flakes, and three pieces of shatter. Twenty-three debitage specimens show dorsal cortex. Three cores (two argillite, one basalt) were found among the flakes. With the exception of one quartzite mano, all the ground-stone artifacts are made of sandstone. Analysis describes a total of four metate fragments, two mano fragments, and a complete mano in the site assemblage. Of these seven specimens, two of the manos and one of the metate fragments exhibit a red color change from heat exposure. At least two looters' piles were found on site. One contained metate fragments (FS 1, 2, and 3); the other had a core, mano, metate (FS 4, 5, and 6 respectively), and other flakes. Because no deposition remains at the site, no further information can be recovered.

5LA8241

The site lies on a mesa top overlooking an unnamed drainage to the north and the northern most side of a drainage leading south to Taylor Arroyo. Artifacts found at the surface are an unknown type, argillite projectile point (FS 1), a multifunctional basalt core-tool, numerous pieces of ground stone, and debitage. The debitage is made of hornfels/basalt (7) and quartzite (1). Six of these are flakes (five simple, one complex) and two are shatter. The ground-stone artifacts are two granite manos and three sandstone metate fragments. The artifacts are eroding out of the north side of the mesa and are exposed in the numerous, small arroyo cuts. Numerous piñon pines are seen within the site boundary, and the vegetation community is juniper scrub. No additional work is recommended.

5LA8242

The site is a sparse scatter of debitage and ground stone. This small site is located on a plain directly west of an arroyo that runs southeast to Taylor Arroyo. A soil layer of light-brown, silty loam is seen at the surface and supports the sparse grassland vegetation. The artifacts are visible in barren patches of ground. The site is heavily deflated, as evidenced by the large pieces of thermally altered rock and artifacts scattered randomly across the ground. The ground-stone artifacts are highly fragmented and, for the most part, do not cojoin (only FS 7 was reconstructable). Field analysis recorded five sandstone metate fragments and two quartzite mano fragments. All recorded debitage specimens are of chert, basalt, quartzite, or argillite. Three of the seven specimens are simple flakes, three are complex flakes, and one is shatter. No features are noted, and this site is not considered significant.

5LA8243

This site is a sparse, 38 m east-west by 28 m north-south artifact scatter on a gently sloping southeast trending ridge. It is located beside a broad mesa in an open area among piñon and juniper trees. The site has been eroded, and large gravel debris can be seen at the surface. The artifacts consist of four basalt flakes and a mano fragment. No diagnostics or thermal features are noted at the surface. This small site is not significant.

5LA8244

The site sits on a ridge with several small arroyos bisecting it in a north-south direction. The site consists of a large lithic scatter and a heavily eroded scatter of thermally altered rock that is designated Feature 1. The site is located in juniper scrubland, and surface visibility is 60%. The site is highly eroded and deflated, with limestone bedrock exposed at the surface in some areas. In other areas, the soil depth is up to 50 cm, but these locations are rare. Most artifacts were recorded within the erosion remnants in the site. Debitage data show 26 simple flakes, 17 complex flakes, and eight pieces of shatter. Three retouched flakes of argillite, basalt, and siltstone were recorded. Ground stone recovery was minimal, consisting of one sandstone metate fragment and one granite mano fragment. No thermal features are noted, and no further work is recommended for this site.

5LA8245

Site 5LA8245 is a small lithic scatter on a gently sloping ridge in piñon/juniper scrubland, approximately 2000 m west of Burson Camp. Recorded artifacts include nine flakes and fragments from two separate metates (FS 1 and FS 2). Five of the flakes show some degree of dorsal cortex. The flakes are five complex and four simple specimens. The majority are quartzite (5), with basalt (2), chert (1), and Alibates dolomite (1) also seen. Visibility is good in many places, as deposition is shallow and shale bedrock is eroding to the surface throughout the site area. Vehicle tracks and footprints evidence the human disturbance on site. No features are identified, and this site is not considered significant.

5LA8246

The site is located on a terrace of a ridge overlooking a small, unnamed drainage. During analysis, seven flakes (six simple, one complex), one unfinished argillite biface, and one retouched chert flake were identified. The flaking debris is hornfels/basalt (4), argillite (2), and quartzite (1). This site is subject to water erosion, and very little intact soil remains. Visibility is good (roughly 70% at the surface), which supports a variety of vegetation, including piñon, juniper, galleta grass, rabbit brush, and purple threeawn. This sparse lithic scatter is not considered to have integrity.

5LA8247

The site is a sparse lithic scatter with ground stone. It is located on a mesa top that slopes gradually to the east. The artifacts were recovered in an open area of shale gravel nestled between piñon and juniper trees. Associated vegetation includes purple threeawn and various species of grama grass. This site appears highly deflated and eroded, as evidenced by the shale bedrock and thick gravels at the surface. Analysis revealed six complex flakes, four mano fragments, three simple flakes, two pieces of shatter, and one slab metate fragment in the assemblage. The materials are sandstone for the ground-stone artifacts and basalt (8), quartzite (2), and argillite (1) for the flakes. No indications of fire-cracked rock or oxidation are present.

5LA8248

The site is generally a sparse lithic scatter with two distinct artifact concentrations (Features 1 and 2). It is located on a finger ridge, which is on the south edge of a mesa in the Big Arroyo Hills. The artifacts are visible in open areas of shale bedrock exposed at the surface due to water erosion. Artifacts consist of two sandstone mano fragments, one retouched chert flake, one quartzite core-tool, and flaking debris consisting of fine-grained quartzite (76%), coarse-grained quartzite (10%), chert (8%), basalt (3%), and obsidian (3%). Piñon, juniper, rabbit brush, cholla, and grasses characterize vegetation at the site and surrounding area. Because this site is small and no diagnostics or thermal features are noted, additional work is not recommended.

5LA8249

The site consists of a dense scatter of flaking debris and ground stone located in the open gravel areas on an east-west ridge between piñon and juniper trees. The terrain contains shale outcrops, gently sloping to the east. Vegetation of the site includes juniper, piñon, rabbit brush and various grasses.

The flakes, analyzed on site, are made of hornfels/basalt (63), argillite (25), quartzite (7), chert (2), and siltstone (2). Reduction stages for the flakes are simple (64), complex (30), shatter (3), and biface-thinning (2). The tool assemblage consists of two sandstone slab metate fragments, two non-bipolar cores (one quartzite, one basalt), one quartzite biface fragment, one granite mano, one small argillite point fragment (Type P48, Late Prehistoric Stage), and one large chert point fragment. The fragmented nature of the large point makes identification tenuous. The biface fragment shows light use wear on both steep lateral edges.

The area is moderately eroded, and many of the artifacts are located on exposed bedrock. No surface features are noted, and the site does not have research potential.

5LA8250

Site 5LA8250 represents a lithic scatter with a historic component. The site sits on a slight rise on top of a mesa in the Big Arroyo Hills in an area of juniper scrub. The site slopes rather gently to the east and has been moderately disturbed by erosion and mechanized activity. Light-brown, silty loam covers the surface, along with piñon, juniper, and various grasses. Artifacts analyzed in the field include debitage, flaked tools, and ground-stone tools.

The historic component consists of two structures: Feature 1 is a pile of juniper logs and milled lumber with wire nails and a sparse scatter of construction materials; and Feature 2 is a privy of milled lumber and wire nails. Both structures have been destroyed by military activity, and a concealment area was made of lumber from Feature 1. The only associated artifacts remaining on site are several wire bundles, two cast-iron braces, and two pieces of corrugated metal. Based on the artifacts and the history of the region, the historic structures likely date ca. 1890-1920.

Noted in the twelve debitage specimens sampled are six simple flakes, five complex flakes, and a piece of shatter. The majority are made of basalt (6), and fine-grained quartzite (3), with lesser amounts of other materials, including argillite (1), chert (1), and Alibates dolomite (1). The presence of cortex on all the debitage specimens indicates these materials were recovered from nodules or waterworn sources.

The tool assemblage includes four slab metate fragments, one complete mano, one mano fragment, one basin metate fragment, and one utilized flake fragment. Other than one quartzite mano, all ground-stone artifacts are made of sandstone. The utilized flake is made of nonlocal Alibates dolomite and exhibits light usage on the distal end.

Overall, the site visibility is good (70%). Artifact density is low and no features are identified, making this site a poor candidate for additional work.

5LA8251

This site is a sparse scatter of lithic artifacts found within a large historic trash dump. It is located in an open grassy meadow along a north-south trending ridge that joins with a long ridge finger near the south edge of Big Arroyo Hills. Piñon and juniper forest provide the canopy for various grasses and an occasional rabbit bush. The site slopes gently to the southeast. A modern barbed-wire fence bisects the northern portion of the site.

The historic trash scatter is in an open, grassy meadow and follows the top of the ridge. The highest portion of artifacts is located in the southern portion of the site near the datum. Modern trash is found at the north end of the site, but some has been mixed with the older artifacts. Artifacts recorded include glass (window and bottle), whiteware, stoneware, and porcelain, numerous wire nails, tin cans (50+), milled lumber, and many household and specialized farming items. Based on the size and abundance of some artifacts, it is likely there was an early structure that was later removed. No foundations are present. Many trees show evidence of being hand chopped or burned down. Trash was likely dumped in this locale ca. 1880 to 1970.

The lithic artifacts found in the site area were scattered randomly and are not concentrated in any area. These include four complex flakes (two basalt, two quartzite), four metate fragments (all sandstone), three (two basalt, one argillite) simple flakes, and one quartzite mano fragment.

The site shows only 10 cm of soil deposition and, for the most part, is moderately eroded by wind and water. Both the historic and prehistoric component exhibit no surface evidence for features and have little potential for intact buried cultural deposits. No additional work is recommended.

5LA8252

This small (8.5 m by 3 m) site is a sparse lithic scatter located on a small, east-sloping finger ridge that overlooks an unnamed drainage and diversion dam to the east. The artifacts recovered are a chert side scraper and two basalt flakes. The surface of the site appears highly eroded due to the slope gradient (4 degrees) and episodic sheetwash erosion. On-site vegetation includes juniper trees, cholla, prairie sunflower, galleta grass, and side oats grama. No features were seen, and it is likely that all small artifacts may have washed downhill into the drainage area. This site is not significant.

5LA8253

The site is situated on a sloping plain at the bottom of a ridge, approximately 200 m north of a drainage. Vegetation consists of grasses (purple threeawn, brome, and needle and thread grass) and bushes (low sage and rabbit bush), with a light scattering of juniper trees. Artifact density is extremely sparse, consisting of four artifacts: two quartzite flakes (one of which is retouched

along one edge), one granite mano fragment, and one basalt flake. The site has an estimated deposition of 10 cm and shows light disturbance owing to erosional factors and military maneuvers.

5LA8254

The site is located among some junipers on a slope above an unnamed drainage to the west-northwest. A portion of the site is situated in a gully that washes down to an arroyo to the west. Burson Camp is to the west-southwest. Surface visibility is extremely good, and site disturbance is caused mainly by erosion, with little military impact. The artifact assemblage is twelve flakes, two of which show retouch along one edge, a small, unknown-type chert projectile point, and a piece of basalt shatter. The flakes are made of quartzite (6), basalt (5), and argillite (1). This site is very near 5LA8231 and could be related to it. The surface is composed of light-brown, silty loam and shows no evidence of thermal features. This small site is insignificant.

5LA8255

The site is located on a gentle slope next to an unnamed drainage of Taylor Arroyo in a patch of juniper/piñon scrub. It is small and localized, and consists of seven pieces of flaking debris, three projectile points, and one core. Two points were unnotched and the other is corner-notched. One small quartzite preform (Type P42) is perhaps Late Prehistoric. The second quartzite preform (Type P4) and the large corner-notched basalt point (unknown type) are likely Archaic. Materials include basalt (3), quartzite (3), and argillite (1) for the flaking debris that was further classified as simple flakes (3), complex flakes (3), and shatter (1). The surface is subject to water erosion leading to good visibility (75%). Overall, the site is deflated and very little soil deposition is present. No features are noted. The site is insignificant.

5LA8256

This is a large lithic scatter located on a low ridge that encompasses 2.02 acres. The site is located between two drainages to the east and west and is covered in juniper scrub. When this site was recorded, yucca, low sage, cholla, and various grama grasses were also noted on the light-tan, silty loam soil at the surface.

A total of 260 pieces of debitage were analyzed in the field and include the specimens from one extensive concentration (Feature 1). These are made of argillite (73%), chert (7%), fine-grained quartzite (6%), basalt (6%), silicified wood (2%), Polvadera Peak obsidian (2%), chalcedony (2%), coarse-grained quartzite (1%), and Alibates dolomite (1%). The artifact classes are 164 simple flakes, 75 complex flakes, 18 pieces of shatter, and 3 biface-thinning flakes. Unlike most of the sites in the project area, only 25% of the flakes show some degree of dorsal cortex. Argillite (n=52, 20%) shows the most cortical specimens in the assemblage.

There are four artifact types represented in the flaked tool assemblage, including three retouched flakes, one chert non-bipolar core, one unfinished quartzite biface, and one large quartzite corner-notched projectile point (Type P27, Archaic). Of the retouched flakes, one is obsidian, one is basalt, and one is quartzite. Both the obsidian and basalt specimens show use

wear on one steep edge. The quartzite flake was utilized on the acute right lateral edge. Six ground stone specimens were recorded, including three mano fragments, one basin metate fragment, one complete edge ground cobble, and one complete mano.

No thermal features are noted and very little soil deposition remains. A moderate amount of disturbance from wind and water erosion as well as military activity is present. No further work is recommended for this site.

5LA8257

Site 5LA8257 is located on a flat grassy plain south of Burson Camp near the edge of a drainage area. The artifacts, consisting of six pieces of debitage, were located in blowout areas where erosional activity is constantly occurring. Material types are hornfels/basalt (5) and argillite (1) for the debitage specimens that are classified as three simple flakes, two pieces of shatter, and one complex flake. No features or diagnostic artifacts are noted. This site does not offer the potential for further research.

5LA8258

The site is located on a low ridge between eastern and western unnamed drainages. Burson Camp is approximately 40 m to the south. Artifact density is low and dispersed; however, two small, corner-notched projectile points (chert and fine-grained quartzite) were recovered. Under Anderson's (1989) classification scheme, the fine-grained point was recorded as a P58 and the chert point as a P59. The other tool recovered at the site is a quartzite core. Of the seven flakes recorded on site, five are complex flakes and two are simple. Three are made of argillite, two quartzite, one silicified wood, and one basalt. On site vegetation is juniper, grama grass, and yucca. Disturbance appears heavy, in part to the close proximity of Burson Camp and water erosion in the drainage areas. No fire features are evident.

5LA8259

The site is located to the east of the existing house at Burson Camp (the driveway leading to the house bisects the site). It sits on top of a ridge between two drainages to the east and west. A variety of grasses, low sage, and yucca cover the ground between small stands of juniper and piñon trees. The in-field analysis recorded 23 pieces of debitage, two projectile points, one bifacial core/tool, one mano fragment and one metate fragment. The predominant lithic material includes hornfels/basalt (35%) and chert (30%), with some coarse-grained quartzite (22%), argillite (9%), and fine-grained quartzite (4%). The large projectile point is made of argillite and cannot be "typed." The other is a small, side-notched, fine-grained quartzite point (Type P84) that dates to the Late Prehistoric. No thermal features are noted. Surface disturbance is heavy, owing to activity around the house. This site is not eligible for the NRHP.

5LA8260

The site is located on a slope facing an unnamed drainage of Taylor Arroyo, approximately 140 m to the northwest. Surface visibility is good, with some coverage of trees, grasses (purple threeawn, grama), rabbit bush, yucca, and low sage. Wind and water erosion is moderate and, due to army maneuvers, surface disturbance is light to moderate in places. Artifacts found on site include lithic debitage, composed of hornfels/basalt (37%), quartzite (29%), argillite (17%), and chert (17%), and one retouched silicified wood flake. Lithic reduction activity is inferred based on the four debitage classifications: eleven simple flakes, nine complex flakes, three pieces of shatter, and one biface-thinning flake. Artifact density is low and fairly evenly distributed, with the exception of a small cluster of lithics in the northwestern part of the site. No thermal features are identified at the surface. Additional work is not warranted.

5LA8261

This site is a 70 x 80 m scatter of lithic artifacts located on the eastern face of a slope that is approximately 5 km south of Burson Camp. It is located in the transition zone between juniper scrub and grassland, with cholla, prickly pear, grama grass, low sage, and rabbit bush at the surface.

Chipped stone artifacts include 54 pieces of debitage, 2 projectile points (1 chert, 1 basalt), 1 small quartzite projectile point, 1 retouched argillite flake, and 1 basalt non-bipolar core. In the debitage, hornfels/basalt (65%) is the dominant material type with chert (13%), argillite (9%), silicified wood (6%), coarse-grained quartzite (4%), limestone (2%), and fine-grained quartzite (2%) also represented. Fifty-two of the specimens are classified as flakes (35 simple, 16 complex, 1 biface-thinning), and two are shatter. One small projectile point preform tenuously indicates a Late Prehistoric age for the site. The recorded ground stone consists of two metate fragments and two mano fragments.

The soil is light-brown, silty loam and suffers moderate disturbance from episodic sheetwash activity, and heavy disturbance from military and other forms of historic activity. A downed barbed-wire fence cuts through the site, and a two-track road is present at the west boundary. The site has no thermal features and is not a likely candidate for additional work.

5LA8262

The site is a dispersed lithic scatter with no thermal features. It is on a narrow, flat top of a steep ridge approximately 180 m north of an intermittent drainage. Surface visibility is good because the surface is mainly outcropping bedrock (limestone); very little developed soils remain. Many isolated juniper trees provide a canopy for several species of grama grass. The primary disturbance is wind. Lithic materials consist of four flakes and two metate fragments in addition to one edge-ground mano. Recorded materials are argillite, basalt, quartzite, and sandstone. The edge-ground mano is made on a fine-grained basalt cobble and was collected. This site is not significant.

5LA8263

This site is very small and consists of one simple argillite flake, one complex basalt flake, and one sandstone mano fragment. It is located at the head of a small ridge that slopes to the southeast. With the area primarily covered by bedrock, surface visibility is excellent. Sparse vegetation consisting of juniper, piñon, and a minimal amount of grama grass is seen. A downed barbed-wire fence lies at the south end of the site. Disturbance is moderate, owing to erosion. This site is not eligible.

5LA8264

The site consists of one complex basalt flake and a P4 projectile point made of chert. Anderson (1989) suggests a date range of 4000 BC to AD 500 for this type of point. These were recovered on a flat ridge top with eroding and broken shale visible at the surface. Juniper and piñon trees dominate the sparse surface vegetation. No additional research is recommended for this small lithic scatter.

5LA8265

This small (15 x 6.5 m) site is composed of eight pieces of debitage, one small patterned biface, one mano fragment, and four metate fragments from one specimen. It is located at the top of a juniper-covered mesa with outcropping shale bedrock exposed throughout the surface area. The material types for the debitage specimens are quartzite (6), basalt (1), and argillite (1). All of the metate fragments are sandstone, the mano is granite, and the biface is quartzite. In addition, several pieces of fire-cracked rock are noted at the surface, along with patches of burned shale. These may have been fire features at one time, but the process of water erosion has displaced any intact fill. Based on the low information potential, this site is not significant.

5LA8266

This site is a scatter of lithic debitage and tools which are located along the top of a northeast to southwest trending ridge at the south edge of the Big Arroyo Hills. Grey to white shale bedrock is exposed throughout the site, with soils ranging from 10 to 20 cm at the center portion of the site. The sparse vegetative community is juniper scrub.

Of the 104 debitage specimens, 9 material types were observed. Coarse-grained quartzite (30) and Black Forest silicified wood (29) are the largest types, with fine-grained quartzite (21), chert (12), dendritic chert (5), unknown silicified wood (2), argillite (2), Alibates dolomite (2), and chalcedony (1) also observed. The debitage is classified as 54% biface-thinning/resharpening flakes, 26% complex flakes, 19% simple flakes, and 1% shatter. Most of the biface-thinning flakes are small. These were found to be made of eight of the nine material types and suggest that at least eight separate bifaces were manufactured on this site. Also of interest is the presence of nonlocal Alibates dolomite (Texas panhandle), Black Forest silicified wood (Palmer Divide area of central Colorado), and a dendritic chert that appears visually similar to the kind found at the Hartville Uplift in Wyoming. This suggests that the inhabitants of this site were highly mobile or were involved in some kind of trade system.

A total of 12 chipped-stone tools were recovered from the surface. These include four retouched or utilized flakes; four large, thin, patterned bifaces; one quartzite non-bipolar core; one chert scraper; one small side-notched quartzite projectile point; and one unfinished, large argillite biface. The large bifaces are made of quartzite (3) and chert (1). The retouched/utilized flakes are quartzite (3) and dendritic chert (1). The projectile point appears similar to Anderson's (1989) type P79 or P83 and dates to the Late Prehistoric Stage.

Only two ground-stone artifacts were recorded from the site surface. Of these, one is a sandstone metate fragment and one is a complete sandstone mano. Also, a small piece of pottery (5LA8266.0.9) was recovered at the center portion of the site.

Though this site shows a diverse material and debitage type range, no thermal features or structures are noted. Soils are fairly thin except for the central portion of the site. No further work is recommended for 5LA8266.

5LA8267

This site is a sparse lithic scatter consisting of eight pieces of debitage and two mano fragments. Four pieces of hornfels/basalt, three pieces of argillite, and one quartzite specimen comprise the debitage sample. These are further classified as four simple flakes, three complex flakes, and one piece of shatter. Both manos are made of granite, are more than 50% complete, and display use wear on two faces.

The site area is highly eroded with soil (light-brown silty loam) depths of up to 20 cm south of the datum and below the duff in large juniper trees. Besides juniper, piñon trees, needle and thread grass, snakeweed, and mountain mahogany are growing on the site. Shale bedrock outcrops throughout the site area, which has been heavily disturbed by army maneuvers. This is evidenced by deep tank track gouges and some modern trash.

5LA8268

This small site (11 x 8.5 m) is located on a gently dipping (2 degrees), southeast-facing slope above an unnamed arroyo and overlooking a modern cattle tank. The site is located in the transition area between juniper scrub and sparse grassland. On-site vegetation includes juniper trees, yucca, cholla, sunflower, prickly pear, snakeweed, and various grama grasses. The artifacts consist of five simple flakes (three diorite, one basalt, one argillite) and the medial portion of a large, fine-grained quartzite biface. Soil deposition is good (30+ cm) and can be viewed in the sidewalls of nearby erosional cuts. Because this site is located below the southern edge of the Big Arroyo Hills with a steep slope separating the two, it could be the result of residual deposition. This site has a low artifact density, and no fire-features or structures are noted. It is not considered eligible for the NRHP, and no further work is warranted.

5LA8269

This site is a diorite and hornfels/basalt cobble testing area located at the head of an erosional basin along the southern edge of the Big Arroyo Hills. Cobbles of various unworked materials

are eroding out of shallow (up to 10 cm) residual soil deposits at a contact with shale bedrock. This contact likely represents some erosional event where cobble materials were eroded onto the shale and soil was deposited at a much later date. All the lithics observed are simple flakes, which supports material testing. Of the flakes, six are diorite and one is hornfels. No tools, ground-stone artifacts, or features are noted at the surface, and no evidence for military disturbance is present. No further work in needed at this small site.

5LA8270

This sparse lithic scatter measures 49 m east to west and 30 m north to south. It is located on the south edge of the Big Arroyo Hills in an area where the grassland contacts juniper cover. Piñon and juniper trees, yucca, sunflowers, and grama and needle and thread grass sparsely grow throughout the site. The surface soil is light-brown, silty sand with a depth of 15 cm seen in the numerous tracked vehicle ruts. Also, a large amount of modern military trash is littering the site area.

The lithic assemblage consists of nine pieces of debitage and one retouched flake made of argillite. Of the debitage, four pieces are simple flakes, three are biface-thinning flakes, and two are angular pieces of shatter. Five of the nine debitage specimens are made of hornfels/basalt, two are chert, one is argillite, and one is quartzite. Three bifaces (one chert, one argillite, and one basalt) were manufactured or reworked at the site as evidenced by the biface-thinning flakes.

No features or structures are noted. With the heavy mechanized vehicle disturbance, it would be difficult to see if they existed. No further work is recommended.

5LA8271

This site is a dispersed lithic scatter located at the junction of the mesa edge and a narrow northwest to southeast trending finger ridge in the southern portion of the Big Arroyo Hills. Shale bedrock outcrops throughout the site and forms a series of small circular terraces at the center and eastern portion of the site. The site sits within a rather dense juniper cover, with sparse patches of the grama grasses throughout.

The artifact classes include debitage, chipped-stone tools, and ground-stone tools. Artifacts are dispersed over a large area with no apparent concentrations. Of the nineteen pieces of debitage, six are made of argillite, five are hornfels/basalt, three are fine-grained quartzite, two are exotic chert, two are chert, and one is a coarse-grained diorite. Eleven pieces are classified as simple flakes, four are complex flakes, two are biface-thinning flakes, and two are shatter. The stone tools are one large, unpatterned, chert biface, and one retouched chert flake. The ground-stone assemblage consists of one quartzite edge ground cobble, one sandstone mano fragment, and two sandstone metate fragments.

A deflated fire feature is noted southeast of the datum near the eastern site boundary. It measures 3.5 x 4 m and is composed of dark, ashy gray soil with burned chunks of shale intermixed. This feature appears to be an erosion remnant and is smearing downhill due to water erosion.

Overall, no intact cultural fill remains on this site, and the artifacts and feature appear to have deflated to the top of shale bedrock. This property is not considered eligible for the NRHP, and no further work is needed.

5LA8272

This site is located at the top of a ridge in an open area approximately 50 m southwest of an intermittent drainage. Sparse stands of piñon and juniper grow out of the gravel-packed, silty loam soil. Very little soil deposition is apparent, and the site has been disturbed by army maneuvers. The artifacts consist of one slab metate fragment, basalt, argillite, and quartzite flakes, a quartzite end scraper, and a basalt core. This small site shows low artifact density, little soil deposition, and no surface features. No further work is recommended.

5LA8273

Site 5LA8273 is located at the top of a ridge at an elevation of 5,600 ft. An unnamed drainage with no surface running water is seen 230 m southeast. The site is in an open area with almost no vegetation except juniper, piñon, rabbit brush, and purple threeawn. Disturbance appears moderate – there is evidence of army maneuvers. A two-track road bisects the site from north to south.

The artifacts recovered from this medium-sized concentration of lithics include 34 pieces of debitage, four flaked tools, and three ground-stone tools. Of the debitage, 17 are classified as simple flakes, 12 are complex flakes, and five are pieces of shatter. Most are made of basalt (26), with argillite (4), Polvadera Peak obsidian (2), and quartzite (2) also represented. The flaked tools include an unusually shaped, stemmed quartzite projectile point (unknown type); a large, fine-grained quartzite projectile tip; a quartzite retouched flake; and a quartz bifacial core-tool. The ground-stone assemblage is one quartzite mano fragment, one sandstone metate fragment, and one complete quartzite mano with battering on one end.

Inferred activities on site are lithic reduction, tool usage, and food processing. Soil deposition is shallow and no thermal features were discovered. This sparse lithic scatter is not considered to have integrity.

5LA8274

This site is located across the top of a large L-shaped ridge along the southern edge of the Big Arroyo Hills. The terrain slopes gently to the east, with numerous small arroyos down cutting the eastern and central portion of the site. Shale bedrock is exposed in many areas of the site, with pockets of developed soil (up to 10 cm) seen on the ridge top and soil depths of 35 cm in the arroyo cuts. Some crypogramic soil is visible at the north end of the site. Site vegetation consists of juniper, piñon, side oats grama, purple threeawn, snakeweed, and various wildflowers. The artifact assemblage consists of 51 pieces of debitage, 11 chipped stone tools, and 12 ground-stone tools.

A wide variety of lithic materials are present at the surface. Hornfels/basalt (15), fine-grained quartzite (13), argillite (12), dendritic chert (4), exotic chert (3), limestone (2), chert (1),

and diorite (1) are the material types found in the debitage specimens. These are further broken down into 27 simple flakes, 14 biface-thinning flakes, eight complex flakes, and two pieces of shatter. Five material types are found in the biface-thinning flakes, which suggest that at least that many bifaces were manufactured on site.

The chipped stone tool classes are large patterned bifaces (3), scraping tools (3), unfinished bifaces (3), and retouched/utilized flakes (2). The large patterned bifaces are made of chert, fine-grained quartzite, and coarse-grained quartzite. The scrapers are fine-grained quartzite, limestone, and silicified wood. The unfinished bifaces are made of fine-grained quartzite (2) and silicified wood. Basalt and Cerro del Medio obsidian are the materials for the retouched/utilized flakes.

The ground stone assemblage consists of eight metate fragments, two mano fragments, one complete mano, and one complete-edge ground cobble. All of the metate fragments, the edge-ground cobble, and one of the manos are sandstone. The remaining manos are made on cobbles of quartzite, and conglomerate.

No structures or thermal features are noted. Though some soil deposition is present throughout the site, no further work is recommended. This site is not considered eligible.

5LA8275

Site 5LA8275 is located on top of a thin west-to-east trending ridge along the southern edge of the Big Arroyo Hills. On-site vegetation includes juniper, piñon, and various grama grasses and wildflowers. Soil is generally shallow (5 cm) with decomposing shale bedrock visible on most of the surface. Surface artifacts include twenty-five pieces of debitage, one retouched chalcedony flake, one unfinished argillite biface, two sandstone metate fragments, and two sandstone mano fragments. Three materials are seen in the debitage. Seventeen specimens are hornfels/basalt, seven are argillite, and one is exotic chert. Most of the flakes are classified as simple (15), with complex (8), shatter (1), and biface-thinning flakes (1) also represented. No features are noted.

5LA8276

This small, concentrated lithic scatter is located in the grassy slopes to the south of the Big Arroyo Hills and directly north up the arroyo from Burson Camp. The surface soil is light-brown sandy silt with depths of 20 cm in erosional cuts above the arroyo. Indian paintbrush, wild onion, rabbit brush, buttercups, hairy and blue grama, yucca, and juniper were growing on the site when it was recorded. The artifact assemblage consists of thirty-six chert flakes, two retouched/utilized flakes (one chert; one quartzite), and one sandstone mano fragment. Of the flakes, 18 are biface-thinning flakes, 10 are simple flakes, and 8 are complex flakes. No features were recorded and it appears that a single cobble of chert was reduced at this locale.

5LA8277

The site is located on the mesa edge above the drainage basin which feeds Taylor Arroyo. Vegetation is sparse, and surface visibility is good. There are some areas of up to 20 cm of soil

deposition, though the majority of artifacts are resting on rotten shale bedrock. Artifacts consist of 15 pieces of debitage, six stone tools, and two metate fragments. Hornfels/basalt (9) is the dominant material type, with quartzite (6) making up the remainder. Most (11) are classified as simple flakes, with complex flakes (3) and shatter (1) also represented. The chipped-stone tools are three projectile points, one quartzite core-tool, one basalt non-bipolar core, and one basalt utilized flake. The projectile points are large and likely represent an Archaic occupation. These are made of coarse-grained quartzite (2) and fine-grained quartzite. No features are noted and the site is not significant.

5LA8278

This site is located on a flat-topped ridge along the southeast edge of the Big Arroyo Hills. Soil deposition is shallow, with 10 cm seen at the surface above the shale bedrock, which outcrops at the site surface. The vegetation is classified as juniper scrub. A distinct concentration of silicified wood flakes is designated Feature 1 and likely represents a single reduction episode. Of the 37 pieces of debitage recorded at the site, 32 are silicified wood, two are Polvadera Peak obsidian, and there is one each for chert, quartzite, and hornfels/basalt. Most of the debitage is simple (16), or complex (16) flakes, with shatter (3) and biface-thinning flakes (2) also seen. The flakes are both cortical and non-cortical. No features are noted, and no chipped stone tools were recovered. Both ground-stone artifacts (one mano, one metate) are sandstone and broken. This site is not eligible.

5LA8279

This site is located on a terraced slope that drains to the east into an unnamed drainage. It is located at the base of the Big Arroyo Hills in an area of combination sparse grassland and juniper scrub. The site has been heavily impacted by military maneuvers, and deep tank cuts are seen throughout the site. Field crews noted no features or structures. This site is composed of a scatter of lithic debitage and chipped- and ground-stone tools.

The 67 pieces of debitage observed at the surface are further broken down as 41 complex flakes, 18 simple flakes, 6 pieces of shatter, and 2 biface-thinning flakes. The material types are 57% hornfels/basalt, 16% argillite, 9% chert, 7% fine-grained quartzite, 6% coarse-grained quartzite, 3% Cerro del Medio obsidian, and 2% silicified wood. The biface-thinning flakes are made of chert and fine-grained quartzite, suggesting that at least two bifaces were manufactured or resharpened on site. The majority of the debitage specimens lacked cortex (51).

Eight tools representing five tool classes were recorded in the stone tool assemblage. Of these, three are projectile points, three are retouched/utilized flakes (two quartzite, one argillite), one is a finished chert biface, and one is an unfinished quartzite biface. The points are further classified using Anderson's (1989) point classifications. The first is typed as a P35 point and is made of chert. The argillite point is a P40, and the other chert point is classified as a P49.

The ground-stone artifacts consist of nine metate fragments, three whole manos, and one whole metate. All are made of locally available sandstone.

Though some soil deposition is noted (up to 15 cm), most of the site has eroded down to a sandy shale bedrock. Most of the artifacts were found on the surface, which suggests this site has been deflated. The only soil seen at the surface is secondary in nature. No further work is recommended and this site is not considered eligible.

5LA8280

This site is located on the large alluvial fan that slopes down from the Big Arroyo Hills and is just to the north of Taylor Arroyo and the confluence of its largest side drainage. It is comprised of a historic brush corral (Feature 1), a hearth of unknown age (Feature 2), debitage, and flaked and ground-stone tools. The artifact assemblage consists of 39 pieces of debitage, 3 bifaces (2 chert, 1 argillite), 3 sandstone metate fragments, 1 sandstone mano fragment, and 1 chert scraping tool. Of the debitage, 21 specimens are complex flakes, 14 are simple flakes, 2 are biface-thinning flakes, and 2 are shatter. Hornfels/basalt is the dominant material type (62%), with chert (18%), quartzite (13%), silicified wood (5%), and argillite (3%) also seen. One of the chert bifaces was classified as a Type P14, which dates between 3000 BC and 500 BC. The site does not appear to have potential for additional research.

5LA8281

The site is a sparse scatter of tin cans and bottle glass fragments located on the end of a finger ridge near the foot of a large, south to north running ridge at the southwest edge of the Big Arroyo Hills. The bottle glass appears to be from one vessel. Several downed juniper logs are on the top and on the slope of the hill, and are likely the remains of a brush corral. Because no distinct outline for the corral could be seen, no feature number was assigned. A possible corral latch is seen in the form of bailing wire loops on one juniper log. This site likely dates ca. 1900, based on the amethyst bottle glass and bottle finish. A single sandstone metate fragment was found among the historic artifacts. No historic structures were seen and no further work is recommended for this small (23 x 9 m) site.

5LA8282

This large (198 x 132 m) site consists of a historic trash scatter and a dispersed scatter of lithic artifacts. The site is located directly northeast of a large cattle tank and sits on a flat-topped ridge, at the foot of a large south to north trending ridge. Surface visibility is good, owing to outcropping shale bedrock throughout the site. Small pockets of soil (up to 10 cm) are noted in the erosional features and at the base of trees. All artifacts noted were resting on the exposed bedrock. The sparse vegetation consists of juniper, bunch grass, snakeweed, and buttercups. There is surface damage in places due to military maneuvers as well as water erosion.

The historic artifacts are scattered throughout the northern portion of the site. Artifacts include 18 tin pieces of jar glass (mainly body fragments and base fragments) and one rectangular sanitary can.

A total of 34 pieces of debitage were recorded at the site surface. The artifact classes are complex flakes (15), simple flakes (12), shatter (4), and biface-thinning flakes (3). The material types are fine-grained quartzite (29%), hornfels/basalt (24%), argillite (21%), chert (18%), coarse-grained quartzite (6%), and siltstone (2%). Twenty-nine percent of the flakes show some degree of dorsal cortex.

The tool assemblage consists of two fine-grained quartzite bifaces, eight metate fragments, seven mano fragments, and one edge-ground cobble. The edge-ground cobble is made of sandstone and is whole. All of the metate fragments are made of sandstone, and the manos are made of sandstone (4), quartzite (2), and basalt (1).

With a lack of features and no soil deposition, this site does not offer any potential for additional research.

Chapter VI: LITHIC ANALYSIS

Christopher R. Loendorf and Mark Owens

Introduction

The lithic assemblage consisted of 5,691 pieces of debitage, 637 chipped-stone tools, 416 ground-stone artifacts, and 23 miscellaneous items. Table 6.1 below summarizes functional group and artifact classes for the Training Area 7 lithic artifact assemblage.

The first portion of this chapter describes the raw materials identified in the assemblage, and material sources inside and outside of the region. Next, the debitage analysis procedures and results are discussed. The chipped-stone tool analysis is then described, and patterned tools, flake tools, projectile points, and cores/core-tools are discussed based on material type and morphological attribute. Following this, we discuss the type and nature of the ground-stone tools. The last portion of the chapter contains a section regarding the temporal and functional interpretations for the tools.

Table 6.1. Project Artifact Classes Present in the lithic assemblage.

FLAKED LITHIC GROUP			GROUND STONE/MISCELLANEOUS GROUP		
Artifact Classes	Count	Percentage	Artifact Classes	Count	Percentage
Biface-Thinning Flake	244	3.61%	Hammerstone	20	0.30%
Bipolar Flake	1	0.01%	Edge-Ground Cobble	13	0.19%
Complex Flake	2085	30.81%	Mano	225	3.33%
Shatter	458	6.77%	Metate	171	2.53%
Simple Flake	2908	42.97%	Shaft Straightener	1	0.01%
Non-Bipolar Cores	128	1.89%	Unknown Ground-stone Fragment	2	0.03%
Core-Tools	27	0.40%	Celt	1	0.01%
Bipolar Cores	3	0.04%	Polishing Stone	1	0.01%
Biface	123	1.82%	TOTAL	434	6.42%
Chopper	1	0.01%			
Chopper/Hammerstone	1	0.01%			
Drill	8	0.12%			
End Scraper	17	0.25%			
End/Side Scraper	35	0.52%			
Perforator	1	0.01%			
Side Scraper	15	0.22%			
Uniface	36	0.53%	Overall total (n=6767)		
Utilized/Retouched Flake	78	1.15%			
Projectile Point	164	2.43%			
TOTAL	6333	93.58%			

Raw Materials

Since the size, shape, and fracture toughness of chipped-stone raw materials constrain both the reduction techniques that can be employed and the character of the resulting artifacts (Andrefsky 1994), it is necessary to consider raw material constraints in any lithic analysis. This section provides a brief description of the chipped-stone raw materials used by the prehistoric inhabitants of the PCMS. It should be noted here that crew members performed material type analysis in the field, but the crew chief was consulted in cases of arbitrary identification. In many ways the field identification of raw material types is not that different from the procedures used in the laboratory. Nonetheless, the material identification should be recognized as subjective.

Fracture toughness is defined as the stress-intensity factor necessary to begin the propagation of a crack in the stone (Cotterell and Kamminga 1987:678). It is a fundamental characteristic of chipped-stone raw materials, and although oversimplified, a meaningful dichotomy may be drawn between fine- and coarse-grained materials. Coarse-grained materials generally have much higher fracture toughness than do fine-grained materials (Andrefsky 1994). Thus, not surprisingly, prehistoric flintknappers generally appear to have employed fine-grained and coarse-grained materials for different tasks.

Because of their lower fracture toughness, fine-grained materials are well suited for thinning and shaping into patterned tool types. In contrast, the high fracture toughness of most coarse-grained materials makes them extremely difficult (if not impossible) to retouch by pressure flaking into some patterned tool types. However, high fracture toughness would have been advantageous for their use as expedient tools because the working edges would have dulled much less quickly than the fine-grained materials, which are more brittle. Consequently, fine-grained materials are closely associated with the production of patterned tools, whereas coarse-grained materials appear to have been used for the production of expedient flake tools.

Although grain structure varies somewhat within any given material type, the different types can be grouped into these two broad generalizations (fine- or coarse-grained). Materials that generally have a finer grain, identified during the Training Unit 7 research, include chert, chalcedony, limestone, orthoquartzite, silicified wood, siltstone, fine-grained quartzite, quartz, and obsidian. Coarse-grained materials include hornfels/basalt, coarse-grained quartzite, conglomerate, diorite, sandstone, schist, welded tuff, granite, and argillite.

Most of chipped-stone raw materials used by the prehistoric inhabitants of the survey area appear to have been available locally, but several material types were transported from greater distances. Jemez Mountain obsidian, Alibates dolomite, dendritic chert, and Black Forest silicified wood were all brought into the area from fairly substantial distances. Other materials such as some quartzites and chert were probably transported much shorter distances to the survey area.

The ground-stone assemblage reflects the use of a relatively narrow range of raw material types that are all available in the immediate project area. Sandstone represents nearly 75 percent of the total material assemblage. Identifiable sources of sandstone include the sedimentary rocks

from the Dakota Group, Morrison Formation, Bell Ranch Formation, and Entrada Sandstone. These are exposed in the side canyons and floors of Taylor Arroyo, lower Van Bremer Arroyo, portions of Burke Arroyo, and the numerous side drainages that feed these main arteries (Evanoff 1998; Johnson 1984).

In large parts of the project area, the surface geology is attributed to Quaternary alluvium, pediment sediments, and colluvium. Unmodified nodules and cobbles of the remaining lithic material types can be found weathering out at the surface or in intermittent stream gravels. Olivine basalt and argillite are found along the southwest margin of the PCMS at the hogback.

Debitage

Debitage Analysis Procedures

The debitage assemblages from sites identified in Training Area 7 were analyzed in the field using a system developed for PCMS fieldwork by Stanley Ahler. A single lithic analyst performed the field collection of lithic data for each field crew, and attribute data was logged into "palm sized" computers in database format. This section provides a description of the recorded data, and the field procedures for the collection of these data.

Macroscopically unmodified chipped-stone artifacts were classified in a system based on Ahler's (1989) approach of chipped-stone mass analysis. This type of analysis focuses on size-grade distributions of different raw material types represented in any given context. The analysis is based on the assumption that, in proportional terms, more smaller flakes were generated during the later stages of lithic reduction, and larger flakes would dominate during the earlier stages of lithic reduction strategies.

Two size grades (large and small) were used to classify debitage size. Small handheld wire mesh screens with ½ inch square openings were employed to measure flakes in the field. The large size grade included flakes that would not pass in any orientation though a ½ inch square inch screen; this included flakes with a minimum dimension greater than 0.71 inches (the diagonal of a ½ inch square). The small size grade consisted of flakes that passed in any orientation through a ½ inch square screen; this included flakes with maximum dimensions of less than 0.71 inches.

A number of chipped-stone raw material types are known to outcrop in the PCMS, and most were classified by Andrefsky (1990a). More recently, Ahler (1996) collected a number of lithic raw material samples from a variety of locations in the PCMS in order to redefine the typology and provide reference materials. The most common PCMS material types and nonlocal materials that could be identified based on visual observation were chosen as categories for this analysis system. Most nonlocal materials were also collected in the field and analyzed in the field laboratory. These were classified as to "source" based on comparison with known lithic material specimens, or in some cases, using ultraviolet fluorescence identification.

Also recorded was the presence or absence of cortex (the weathering rind or natural exterior surface of the raw material). It may appear as discoloration caused by chemical weathering or as a smooth polished surface that resulted from water tumbling. Cortex was recorded as absent if no cortex was present on the dorsal flake surface or platform. Cortex was recorded as present if cortex was present in any amount on the dorsal flake surface or platform.

In addition to size and material information, debitage items were classified according to debitage category. The categories include chunk/shatter, simple and complex flakes, bifacial-thinning flakes, and bipolar flakes.

Debitage Analysis Results

A total of 5,691 pieces of debitage were analyzed from project sites and isolated finds, and these represent over 84% of the total artifact assemblage. Thirteen material types were noted (Tables 6.2 and 6.4). Not surprisingly, hornfels/basalt (37%) and argillite (33%) are the dominant material types; but chert (11%), coarse-grained quartzite (8%), fine-grained quartzite (4%), and silicified wood (3%) also showed relatively high percentages. Chalcedony, diorite, limestone, obsidian, quartz, and siltstone are represented by less than one percent. These materials are 75% microcrystalline, 17% cryptocrystalline, and 8% macrocrystalline. The high proportion of microcrystalline materials is attributed to the abundance of locally available argillite and hornfels/basalt. Exotic (nonlocal) materials seen in the debitage are Alibates dolomite (8), Black Forest silicified wood (44), Jemez Mountain Obsidian (17), and dendritic chert (1). The dendritic chert is visually similar to that from the Hartville Uplift in Wyoming. Source locations for these materials indicate a north-south oriented trade and exchange network with the PCMS roughly in the middle.

Simple flakes (51%) and complex flakes (36%) dominate the assemblage, and fewer pieces of shatter (8%), biface-thinning flakes (4%), and bipolar flakes (<1%) were noted (Table 6.3). All stages of lithic reduction are represented, with 63% of the assemblage having no dorsal cortex. Large items account for 51% of the assemblage, and 49% is small.

The simple flakes comprise the largest debitage class (n=2,908). A simple flake is a freehand percussion or pressure flake that exhibits parts of two or fewer previous flake scars on the dorsal surface (exclusive of small platform trimming/shaping flakes). The flake may or may not retain the platform (i.e., this category includes broken flakes that lack platforms). Like the overall debitage assemblage, twelve material types are recorded, and a selection preference for hornfels/basalt (41%) and argillite (34%) is seen. Most of the remaining flakes are chert (8%), coarse-grained quartzite (7%), fine-grained quartzite (4%), and silicified wood (3%). Obsidian, chalcedony, quartz, limestone, diorite, and siltstone comprise the last 3% of the materials. Fifty-eight percent of the simple flakes are noncortical and 42% show some degree of dorsal cortex. Of these, 38% are noncortical small flakes, 25% are cortical large flakes, 20% are noncortical large flakes, and 16% are cortical small flakes. The high proportion of cortical flakes and large-size specimens indicates that most of the simple flakes are the result of core reduction activity.

Table 6.2. Debitage Class by Material Type.

Material	Debitage Class					
	Biface-Thinning	Bipolar	Complex Flake	Shatter	Simple Flake	Total
Alibates Dolomite	2	0	2	1	3	8
Argillite	49	1	744	121	985	1900
Chalcedony	2	0	10	2	20	34
Chert	88	0	250	58	246	642
Diorite	0	0	0	0	11	11
Fine-grained Quartzite	22	0	99	9	124	254
Hornfels/Basalt	15	0	681	222	1185	2103
Limestone	0	0	9	1	11	21
Obsidian	1	0	31	1	22	55
Quartz	0	0	4	6	17	27
Coarse-grained Quartzite	28	0	181	27	199	435
Silicified Wood	37	0	68	10	83	198
Siltstone	0	0	2	0	1	3
Total	244	1	2081	458	2907	5691

TABLE 6.3: Summary Data for Debitage Type.

	Bifacial-Thinning	Bipolar	Complex	Shatter	Simple	Total
Total	244	1	2081	458	2907	5691
Large	46	1	1210	303	1328	2888
Small	198	0	872	155	1579	2804
Cortical	15	0	603	256	1218	2092
Noncortical	229	1	1479	202	1689	3600
Large/Cortical	8	0	433	188	741	1370
Small/Cortical	7	0	170	68	477	722
Large/Noncortical	38	1	777	115	587	1518
Small/Noncortical	191	0	702	87	1102	2082

TABLE 6.4: Summary Data for Material Type.

	Total	Large	Small	Cortical	Noncortical	Lrg/Cortical	Sml/Cortical	Lrg/Non	Sml/Non
Argillite	1900	872	1028	754	1146	418	336	454	692
Chalcedony	34	7	27	6	28	4	2	3	25
Chert	650	171	479	127	523	58	69	113	410
Diorite	11	10	1	8	3	8	0	2	1
Fine Quartzite	254	112	142	69	185	38	31	74	111
Hornfels/Basalt	2103	1353	750	888	1215	675	213	678	537
Limestone	21	20	1	11	10	10	1	10	0
Obsidian	56	15	41	6	50	4	2	11	39
Quartz	27	20	7	15	12	14	1	6	6
Coarse Quartzite	435	269	166	163	272	129	34	140	132
Silicified Wood	198	36	162	44	154	11	33	25	129
Siltstone	3	3	0	1	2	1	0	2	0

The small noncortical flakes show, at least to a small degree, some early-stage biface/uniface tool manufacturing generated the simple flakes. Nearly all of the simple flakes are made from local materials (99%); the non-local materials are Alibates dolomite (3), Black Forest silicified wood (5), and Polvadera Peak obsidian (3).

Complex flakes are freehand percussion or pressure flakes that lack the specialized features of a bifacial-thinning flake but which do clearly exhibit all or parts of three or more previous flake scars on the dorsal surface (exclusive of small platform trimming/shaping flakes). Once again these flakes may or may not retain the platform. Two thousand eighty-five specimens were classified as complex flakes. Like the simple flakes, argillite (36%) and hornfels/basalt (33%) are the dominant materials; argillite is seen as a larger percentage of the total simple flake count and hornfels/basalt is smaller by 8%. Other complex flakes (31%) are chalcedony, chert, quartzite (fine- and coarse-grained), limestone, obsidian, quartz, silicified wood, and siltstone. Of the argillite specimens, 33% are noncortical small flakes, 33% are noncortical large flakes, 22% are cortical large flakes, and 12% are cortical small flakes. The hornfels/basalt flakes are 33% cortical large flakes, 30% noncortical small flakes, 25% noncortical large flakes, and 13% small cortical flakes. Large complex flakes (57%), both cortical and noncortical, and the presence of cortex (46%) are good indicators for core/raw material reduction. Based on this information, it appears that most of the complex flakes were produced during initial core trimming or the very early stages of biface manufacture. Small noncortical flakes suggest early- to late-stage biface manufacture produced a smaller percentage of the complex flakes. Ninety-eight percent of the complex flakes were made from local materials. Polvadera Peak obsidian (10), Obsidian Ridge obsidian (1), Cerro del Medio obsidian (2), Black Forest silicified wood (11), and Alibates dolomite (2) are the nonlocal materials.

The shatter category consists of 458 items. Chunk/shatter is defined as a angular piece of knappable stone that lacks features which allows determination of the dorsal or ventral surfaces or the direction of force application (i.e., it is not possible to identify a bulb of percussion or platform). Experimental studies indicate that hard-hammer cobble testing customarily generates shatter (Ahler and Christensen 1983:187). Therefore, a high proportion of shatter in the chipped-stone debitage assemblage is used as one indicator to identify cobble testing and early-stage lithic reduction strategies. The following material type distribution is seen for this class--hornfels/basalt (48%), argillite (26%), chert (13%), coarse-grained quartzite (6%), silicified wood (2%), fine-grained quartzite (2%), quartz (1%), chalcedony (1%), limestone (1%), and obsidian (1%). Nonlocal materials recorded in this class include Alibates dolomite (1), Black Forest silicified wood (1), and unknown obsidian (1). These data indicate that some nonlocal materials were being brought to the PCMS in unfinished cobbles and not always in finished tool form. With most of the shatter pieces being large (66%) and cortical (56%), the source area for raw material collection is relatively close. This, unsurprisingly, is shown best in hornfels/basalt, coarse-grained quartzite, and argillite. Only three shatter specimens show evidence for heat exposure.

Bifacial-thinning flakes represent technologically specialized flakes removed from a biface during mid-to-late stages of thinning. Ahler and Christensen (1983:189) identify bifacial-thinning flakes as having, "a thin flattened transverse cross-section; a thin, curved longitudinal cross-section; very acute lateral and distal edge angles associated with feather terminations,

including opposite that of the subject flake; a narrow, faceted and prepared platform representing a small segment of a prepared and dull bifacial tool edge; a lipped platform; little or no cortex on the dorsal flake face; an expanding flake shape; and a diminutive, flattened or subdued positive bulb of force." The debitage assemblage contains 244 biface-thinning flakes and these are made from eight different material classes. The materials are 53% cryptocrystalline, 35% microcrystalline, and 12% macrocrystalline; the material types were chert (37%), argillite (20%), silicified wood (15%), coarse-grained quartzite (11%), fine-grained quartzite (9%), hornfels/basalt (6%), chalcedony (1%), and obsidian (1%). Size and cortex data show that 78% of the assemblage is noncortical small flakes, 16% is noncortical large flakes, 3% is cortical large flakes, and 3% is cortical small flakes. The high proportion of noncortical small flakes coupled with the lack of cortex suggests that most of the biface-thinning flakes are be attributed to late-stage biface manufacturing or resharpening activities. With cortex present on 6% percent of the flakes, some early-stage biface manufacture is evident. Because only 20% of the flakes are large, most of the bifaces produced in Training Area 7 are relatively small to medium in size. Biface-thinning flakes include 30 pieces of non-local lithic material -- 27 Black Forest silicified wood, two Alibates dolomite, and one Cerro del Medio obsidian.

A single bipolar core reduction flake was recorded. Bipolar flakes are technologically specialized flakes indicative of bipolar percussion techniques. The place of force application consists of a point or ridge, often shattered or crushed. These flakes also have evidence of opposing fracture or force applications. Often the distinction between the dorsal and ventral face is difficult to determine. Linear and often parallel flake scar surfaces are apparent. Bipolar flakes tend to have angular, transverse cross-sections and a high frequency of pronounced ripple marks on flake surfaces. The lack of bipolar flakes in the assemblage suggests one of two things. Either sites where bipolar core reduction occurs are not in the Priority I survey area, or bipolar reduction was never a preferred technique in the PCMS region.

Debitage Analysis Summary

During the Training Area 7 survey, on-site analysis of all surface flaking debris was completed, or a 150-flake sample was analyzed on large sites. However, there appear to be some problems with the use of this information. Minute retouch flakes, for example, which tend to be small were not seen in the field analysis, and as a result, the measure of chipped-stone tool maintenance is biased. Also, because field lithic analysis is a subjective endeavor, bias can be introduced into categories such as material type and debitage type. Recognizing these shortcomings, we have tried to use the debitage data to develop patterns of prehistoric use for the southwestern portion (Training Area 7) of the PCMS. Though general, we believe we have obtained some meaningful results.

Raw material availability explains the dominance of hornfels/basalt, argillite, quartzite, and chert in the site assemblages. Argillite and hornfels/basalt can be found primary outcrops or in secondary cobble or nodule form near the hogback. Fine- and coarse-grained quartzite outcrops in and around Taylor Arroyo, Van Bremer Arroyo, and lower Burke Arroyo. Cobbles and nodules of chert can be found in Quaternary lag gravels near upper Van Bremer Arroyo and in intermittent streambeds. The high proportion of local materials suggests the local lithic resources met the technological and quantitative needs of the community. This is seen as an

embedded tactic (Binford 1977, 1979; Binford and Stone 1985) which involves the collection of raw materials incidentally while everyday subsistence activities are occurring. Because very little time and energy was used to collect suitable lithic material, time could be spent on other activities.

Nonlocal materials include Jemez Mountain obsidian (Polvadera Peak, Obsidian Ridge, and Cerro del Medio sources), Alibates dolomite, and Black Forest silicified wood. These items represent only 0.01% of the overall debitage assemblage. Though this is a very small number, a few general statements can be made concerning material form and group mobility. The nonlocal items are 30 biface-thinning flakes, 26 complex flakes, 11 simple flakes, and 2 pieces of shatter. Four of the simple flakes and three complex flakes show cortex; these are Polvadera Peak obsidian (3), Black Forest silicified wood (2), Cerro del Medio obsidian (1), and Alibates dolomite (1). The presence of cortex indicates some nonlocal materials were brought to the PCMS as unmodified cobbles. Nonlocal materials also entered the area as large, unpatterned bifaces or prepared cores, based on the flake types.

One question that needs to be asked is what were the nonlocal materials being used for? From the flakes, it appears that some formal tools, flake tools, and flakes were being produced. It is likely that tool resharpening produced some of the small biface-thinning flakes (29) and small complex flakes (21). It is unknown whether the procurement tactic for nonlocal materials involved seasonal movement or trade and exchange; either way, the transport routes appear to be aligned north-south.

Simple flakes and complex flakes dominate the debitage assemblage, although shatter, biface-thinning flakes, and a single bipolar flake were also noted. Both expedient flake technology and bifacial technology were in use by prehistoric inhabitants. High percentages of simple flakes and the presence of much shatter indicates that formal core reduction or raw material procurement is the dominant lithic reduction strategy utilized in the southwestern portion of the PCMS. This is supported by the fact that access to high-quality lithic material is good. There is also a strong emphasis on flake or tool manufacturing (making retouched flakes, unifaces, bifaces), based on the number of small complex flakes and biface-thinning flakes.

Chipped-Stone Tools

This section presents a description of the chipped-stone artifacts that were collected during the PCMS Training Area 7 survey. A total of 637 chipped-stone tools were collected during the investigation including projectile points, drills, scrapers, large bifaces, cores, hammerstones, chopping tools, and expedient flake tools. A descriptive summary of this analysis, as well as observations regarding the patterns observed in the assemblage are included in the chapter.

Stone Tool Analysis Procedures

Stone tools were recorded as one of three size-grades (large, medium, and small), determined by using hand-held wire mesh screens with ½ inch and 1 inch openings. The large size-grade included stone tools that would not pass in any orientation through 1 square inch openings; these artifacts have a minimum dimension of greater then 1.41 inches (the diagonal of a 1 square inch opening). The medium size-grade includes artifacts that will pass through the 1 inch opening, but will not pass through the ½ inch square opening; these tools have maximum dimensions of less than 1.41 and minimum dimensions of greater than 0.71 inches. The small size-grade includes artifacts that pass through the ½ inch square mesh; these tools have maximum dimensions of less than 0.71 inches.

In addition to this information, material types were coded using the same classification system used for the flakes. Cortex presence or absence was also recorded following the criteria employed in the flake analysis.

During the field analysis, chipped-stone tools were classified as one of eight categories, and only the first five were collected and subsequently analyzed in greater detail. The categories are as follows: small thin patterned biface (arrow point or knife), large thin patterned biface (dart point of knife), other unfinished biface, patterned flake tool, retouched/utilized flake, large crude bifacial core/tool, non-bipolar core, and bipolar core.

Small thin patterned bifaces are bifaces that have been heavily shaped by intentional secondary flaking (i.e., patterned), are small and thin in size and form (i.e., arrow point size), and exhibit only pressure flaking. This type includes both technologically finished and unfinished forms (i.e., both preforms and completed points are included).

Large thin patterned bifaces are defined as a biface heavily shaped by intentional secondary flaking (i.e., patterned), medium to large in size and form (i.e., dart point size), and shaped by pressure flaking and/or percussion techniques with highly regularized bifacial margins. This type also includes both technologically finished and unfinished forms (i.e., both preforms and completed points are included).

Other large patterned bifaces included any other large thin biface that lacked hafting elements and may have been used as hand-held cutting implements; however, macroscopic evidence of use was not necessary for inclusion in this category. These items may be technologically finished or unfinished.

Patterned flake tools are defined as a flake tool with secondary flakes removed to produce a form or outline intended by the knapper (e.g., end scraper). This category was further divided into several types during subsequent laboratory analysis, including end scraper, side scraper, or drill.

Other retouched and/or utilized flakes consisted of unpatterned flake tools with one or more edges macroscopically modified by intentional retouch and/or heavy utilization damage. The outline of these tools is largely a product of the flake blank shape rather than intentional retouch.

Flakes with unpatterned retouch and utilized flakes are included in one category because it is often difficult to distinguish between them for two primary reasons. First, retouch and use involve the intentional application of force to the artifact margin. In the case of retouch, the artifact is held stationary and force is applied using an implement, whereas with utilization the artifact may be pressured against a stationary object; however, despite this difference the two processes may produce identical results. Second, most retouched artifacts are also utilized, making it extremely difficult to completely separate these categories.

Large crude bifacial core-tools consist of thick cores modified by bifacially directed percussion flaking, often with very sinuous or irregular edges. These artifacts may or may not have macroscopic evidence for use wear (i.e., the category includes both cores and bifacially reduced artifacts that may themselves been used as tools).

Non-bipolar cores consist of any core or core-like tool produced by freehand (non-bipolar) percussion flaking. These artifacts sometimes exhibit intensive battering along on the ridges between flake scars and on either end. One possible explanation for this battering is that the artifacts may have been used as pecking stones to roughen the grinding surfaces of metates, or they may have served some other similar function like pecking a petroglyph.

Bipolar cores consist of any core produced by application of opposing forces. The place of force application is often shattered or crushed. Rings of force are often seen from both ends.

Further laboratory analysis was completed for stone tool categories 1 through 5, which were collected, and this information is presented below. These artifacts were collected because their greater degree of culturally induced patterning allows the use of more meaningful analytical procedures, particularly the chronological estimates in the case of projectile points. Metric attributes were recorded according to standards described in Dean (1992).

Patterned Tool Analysis Results

The retouched/utilized tool assemblage other than projectile points includes 313 artifacts that were collected during field investigations. This section describes an analysis of these artifacts. The intent is to provide descriptive data consistent with previous archaeological research on the PCMS. In order to control for inter-observer error, a single individual (Mark Owens) categorized the artifacts as one of eight different types. These types are as follows: end scraper, side scraper, end/side scraper, uniface, biface, spokeshave, drill, or perforator.

Table 6.5 presents the counts of tool categories by material type. Chert (29%), quartzite (23%), and argillite (22%) were the most common materials encountered in the assemblage. Hornfels/basalt was the next most common material; 14 % of the artifacts were classified as hornfels/basalt. Obsidian, silicified wood, orthoquartzite, limestone, chalcedony, and siltstone were recorded in small amounts. Not counting the obsidian items, all other materials can be found locally in the PCMS.

Table 6.5. Patterned Tool Class by Material Type.

Material	Tool Class								
	Biface	Drill	End Scraper	End/Side Scrape	Perforator	Side Scrape	Uniface	Util/Ret Flake	Total
Argillite	31	3	5	6	0	1	6	17	69
Chalcedony	0	0	0	0	0	0	0	1	1
Chert	32	1	5	20	1	9	6	17	91
Coarse Quartzite	14	0	3	0	0	1	3	2	23
Fine Quartzite	23	1	2	3	0	0	6	14	49
Hornfels/Basalt	16	2	0	0	0	2	9	15	44
Limestone	0	0	1	1	0	0	0	0	2
Obsidian	3	0	0	0	0	0	3	9	15
Orthoquartzite	2	0	0	1	0	0	3	0	6
Silicified Wood	2	1	1	4	0	2	0	2	12
Siltstone	0	0	0	0	0	0	0	1	1
Total	123	8	17	35	1	15	36	78	313

Bifaces are defined as artifacts with generally shallow angle retouch on both faces and one or more margins. Bifaces were the most common artifact type; over half of the retouched/utilized tools were classified as bifaces. Some of these artifacts are also difficult to distinguish from projectile point preforms. Bifaces were separated from projectile point preforms primarily based on size and/or the presence of use wear. A total of 123 biface tools were analyzed in the chipped-stone tool assemblage. Of these, most (n=76, 62%) are classified as unfinished. In the finished (n=14, 11%) and nearly finished (n=33, 27%) bifaces, 22 specimens show use wear. Half show an edge angle of less than 45 degrees (cutting wear), and the rest have an angle greater than 45 degrees (scraping wear). Most (86) of the bifaces are broken. In complete bifaces, the length ranges from 24 to 141 mm (average 55.40 mm), the width from 14 to 80 mm (average 36.68), the thickness from 6 to 28 mm (average 12.65), and the weight 3.7 to 272.8 gm (average 41.09 gm). The summary metric data for all complete bifaces is illustrated in Table 6.6. The majority are made of chert (n=32, 25%), argillite (21%), and fine-grained quartzite (21%); smaller amounts of hornfels/basalt (14%), coarse-grained quartzite (10%), orthoquartzite (3%), obsidian (2%), silicified wood (2%), and Alibates dolomite (2%). These materials are 59% microcrystalline, 31% cryptocrystalline, and 10 % macrocrystalline.

Drills are defined as flakes with retouch on opposing margins that forms a narrow neck. A total of eight drills were collected. These artifacts are exclusively made from microcrystalline (75%) and cryptocrystalline (25%) materials. In order to make a drill it is necessary to extensively retouch a flake. Because of this, fine-grained materials would have been preferred over coarse-grained materials. Seven of the eight drills are made from locally available material; the nonlocal item is made from Black Forest silicified wood. The direction of the primary rotation was recorded for five of the drills (the remaining three were indeterminate). In three cases the rotation was clockwise when viewed from the tip down, while the remaining two were counterclockwise. This preference for right-handed rotation may result from the handedness of the individuals who used them. Only one of the drills is complete.

End scrapers are defined as tools with steep-angle retouch on the distal flake margin. These artifacts were generally made from a thick flake. Many end scrapers were probably attached to a handle and used for scraping activities (e.g., removing flesh from animal hides). A total of 17 were recorded from Training Area 7, and they include six material types. Over 82 percent of the end scrapers were made from fine-grained materials; 14 of the 17 end scrapers in the assemblage were argillite, chert, fine-grained quartzite, silicified wood, or Alibates dolomite. The high incidence of fine-grained materials in the end scraper assemblage may be the result of at least two factors. First, these materials generally have very sharp edges that may be well suited for scraping tough but non-abrasive surfaces such as hides. Second, hafting a tool requires considerable additional effort. Consequently, fine-grained materials that could be more readily retouched and thus resharpened were likely preferred to coarse-grained materials that are difficult if not impossible to resharpen and must be discarded when dull. Complete end scrapers (7) have lengths that range from 26 to 99 mm (average 46.75 mm), widths from 22 to 74 mm (average 16.35 mm), and thicknesses from 5 to 46 mm (average 13.87 cm). Weight data shows a minimum weight of 4.8 gm, a maximum weight of 390 gm, and an average weight of 63.56 gm (Table 6.7).

End/side scrapers are defined as artifacts with steep-angle retouch on the distal and lateral flake margins. Over half (52%) of the scraping tools in the assemblage were classified as end/side scrapers. As was the case for end scrapers, most end/side scrapers were made from fine-grained materials. These artifacts were also probably hafted onto a handle, but the addition of lateral retouch suggests they may have been used for a wider variety of tasks than end scrapers. In many instances, this lateral retouch may simply have been done in order to facilitate hafting, but some of these may have been used unhafted. Twenty-one items are complete, and 14 are broken. Complete end/side scrapers range from 18 to 72 mm in length (average 37 mm), 14 to 49 mm in width (average 27.42 mm), and 5 to 18 mm in thickness (average 10.09 mm). Weight clusters from 1.8 to 36.5 g with an average of 13.86 g. Table 6.8 shows the metric data for the end/side scrapers.

Perforators are similar to drills, but they are narrower and minimally retouched. A single item was classified as a perforator. The tool is made of chert and is complete. A single, irregular, pointed projection shows primarily clockwise rotation. The rarity of these artifacts suggests that they were used for specialized purposes that were not part of normal daily activities.

Side scrapers are defined as artifacts with steep-angle retouch on one or more lateral margins. These artifacts may have been used in a hand-held fashion or hafted. Side scrapers occurred at almost the same frequency as end scrapers, but these artifacts may have been used for a greater variety of tasks. Eight-seven percent of the assemblage is microcrystalline material; only one item made of Black Forest silicified wood is nonlocal. Six of the fifteen side scrapers are complete. In these, length clusters around 17 to 65 mm (average 44.6 mm), width 13 to 45 mm (average 28.93 mm), and thickness 4 to 25 mm (average 11.13 mm). The weight ranges from 1.8 to 77.2 g, with an average of 19.28 g (Table 6.9).

Table 6.6: Summary Metric Data for Complete Biface Tools.

Bifaces						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	35	24	141	55.4000	22.6835	514.5412
Width	35	14	80	36.6857	17.3913	302.4571
Thickness	35	6	28	12.6571	6.0437	36.5261
Weight	35	3.7	272.8	41.0914	60.4345	3652.329

Table 6.7: Summary Metric Data for Complete End Scrapers.

End Scrapers						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	8	26	99	46.7500	23.7712	565.0714
Width	8	22	74	36.3750	16.3527	267.4107
Thickness	8	5	46	13.8750	13.4742	181.5535
Weight	8	4.8	390.4	63.5625	132.4448	17541.626

Table 6.8: Summary Metric Data for Complete End/Side Scrapers.

End/Side Scrapers						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	21	18	72	37.0000	12.7984	163.8000
Width	21	14	49	27.4286	9.5056	90.3571
Thickness	21	5	18	10.0952	3.9988	15.9904
Weight	21	1.8	36.5	13.8619	11.4683	131.5224

Table 6.9: Summary Metric Data for Complete Side Scrapers.

Side Scrapers						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	6	48	65	55.1667	6.9402	48.1667
Width	6	13	45	33.0000	11.0815	122.8000
Thickness	6	7	25	14.3333	6.2822	39.4666
Weight	6	5	77.2	33.05	24.1253	582.031

Table 6.10: Summary Metric Data for Complete Uniface Tools.

Uniface Tools						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	16	25	101	48.1250	22.3484	499.4500
Width	16	17	91	40.7500	20.6188	425.1333
Thickness	16	5	26	11.6250	5.6671	32.1166
Weight	16	3.6	256.8	39.1187	65.50002	4290.2869

Table 6.11. Summary Metric Data for Complete Utilized Flakes.

Utilized/Retouched Flakes						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	36	13	92	40.7777	20.1921	407.7206
Width	36	10	88	32.3055	15.7839	249.1325
Thickness	36	2	20	8.6666	4.7015	22.1143
Weight	36	0.2	155.4	19.5722	32.3825	1048.6283

Unifaces are defined as tools with shallow-angle retouch on one face that can be on one or more margins, but only one face per margin. Early-stage projectile point preforms are often difficult to distinguish from unifaces. In this analysis, flakes that lacked invasive retouch and exhibited use wear were classified as unifaces. These tools were fairly common in the assemblage, and a total of 36 were recorded. These artifacts were made from a wide variety of materials suggesting that they were employed for many different tasks. A selection preference is seen for microcrystalline materials (n=25, 69%), but cryptocrystalline (n=9, 25%) and macrocrystalline (n=2, 6%) materials were also used. Table 6.10 shows the metric data for the complete (16) uniface tools. Based on edge angle, these items were used primarily for scraping (22) activities, although some cutting (4) is also apparent. Twenty-eight percent (10) of the unifaces are freshly resharpened with no apparent use wear. In 15 items, both lateral edges were utilized, and in 11 unifaces, only one edge was used.

A total of 78 utilized flakes were recorded in the tool assemblage. Utilized flakes are defined as flakes that lack patterned flake removal, but exhibit macroscopically visible use wear. Unlike the other tool classes, most (n=45, 58%) of the utilized flakes were made from the coarser-grained materials. It is unknown whether the preference for microcrystalline materials is the product of raw material availability or because the high fracture toughness of these materials would lead to much less rapid dulling. Based on the edge angle, the utilized flakes were used for scraping (44%) and cutting (34%); most (57) were used along one edge or end, with fewer showing two (16) or three (5) use locations. In whole utilized flakes (36), the mean length is 40 mm, the width is 32.9 mm. The weight averages nearly 20 gm (Table 6.11).

Projectile Points

A total of 164 projectile points were collected during field investigations in Training Area 7. This section provides a descriptive summary of these artifacts. When possible, projectile points were categorized according to the system developed by Anderson (1989:111-315) for classification of projectile points from the PCMS. The primary division within this system is between large (90) and small (74) projectile points. The larger styles are thought to generally be atlatl dart points or thrusting spear points, whereas the small point category probably includes more recent arrow points.

Projectile point preforms comprise a small proportion of the point assemblage (10%). Preforms were classified as either early-stage or nearly completed. It is often difficult to distinguish early-stage preforms from a variety of different artifact types including unifaces and bifacial knives. Relatively flat artifacts with shallow-angle retouch that lacked use wear were

classified as early-stage preforms in this analysis. Early-stage and nearly completed preforms were not noted in the large point assemblage. This may be a result of a tendency to misclassify these artifacts as bifacial knives.

Projectile points were made from a variety of different raw materials, but fine-grained materials were more commonly used. Material types varied substantially for large and small points (Table 6.12). Fine-grained materials (chert, chalcedony, obsidian, fine-grained quartzite, and petrified wood) that are more brittle and consequently easier to retouch were more frequently used for small points, whereas materials with a higher fracture toughness (coarse-grained quartzite, basalt, and argillite) were more common in the large point assemblage.

Table 6.12: Material Type by Projectile Point Size.

	Projectile Point Size					
Material Type	Small Point	Percent	Large Point	Percent	Total	Percent
Argillite	13	7.93%	18	10.98%	31	18.90%
Chalcedony	3	1.83%	2	1.22%	5	3.05%
Chert	18	10.98%	20	12.20%	38	23.17%
Coarse Quartzite	7	4.27%	14	8.54%	21	12.80%
Fine Quartzite	18	10.98%	9	5.49%	27	16.46%
Hornfels/Basalt	3	1.83%	13	7.93%	16	9.76%
Obsidian	2	1.22%	5	3.05%	7	4.27%
Silicified Wood	10	6.10%	9	5.49%	19	11.59%
Total	74	45.12%	90	54.88%	164	100.00%

Diagnostic Projectile Points

This section summarizes metric attributes and shape characteristics for projectile points that could be categorized according to the Anderson system. It was possible to assign 102 of the projectile points to "type" categories in the Anderson typology. The remaining artifacts were too fragmentary to classify.

The following sections describe the projectile point classes in the Anderson system, and each of the different categories that are represented in the Training Area 7 assemblage. In order to facilitate comparisons with previous analyses, data are presented here in the same format employed by Anderson (1989). A brief summary of each point type is presented, and then the categories within the class are summarized.

Large Unstemmed Point Class

This class consists of large projectile points that lack shoulders and stems. This class of points was relatively rare and it accounts for only 8 percent of the classifiable projectile points. A total of 8 artifacts representing 4 types were classified as large unstemmed points. Half of the artifacts in this class were assigned to Type P4, which includes teardrop-shaped bifaces.

Category P4 points may have been preforms for large projectile points that were discarded or lost prior to completion. Anderson (1989:119) suggested a broad age estimate of 5000 BC to AD 500 for this type. This long time span for a category is probably a reflection of the unfinished state of these artifacts, as they may have been made into a number of different styles if completed.

CATEGORY P1 (Figure 6.1)

Number of Artifacts: 2
Catalogue Number: 5LA8023.0.4, 5LA8024.0.1

Description: These point bases have missing tips, bi-convex cross-sections, straight blade edges, no shoulders or stem, and a concave base. The bases have been ground. An age estimate of between 8500 BC to 5900 BC is suggested for this category (Anderson 1989:116-117).

Metric Attributes

Length:	----
Width:	19 mm – 21 mm, mean=20 mm, n=2
Greatest Thickness:	5 mm – 7.9 mm, mean=6.5 mm, n=2
Blade Length:	----
Blade Width:	19 mm – 21 mm, mean=20 mm, n=2
Haft Width:	5 mm – 6.9 mm, mean=6 mm, n=2
Base Width:	16.4 mm – 20.3 mm, mean=18.4 mm, n=2

Material Types: Quartzite (50%), Chert (50%)

CATEGORY P2 (Figure 6.1)

Number of Artifacts: 1
Catalogue Numbers: 5LA8268.0.1

Description: The point has a missing tip, bi-convex cross-section, unknown blade edges, unknown shoulders, a contracting stem, and a straight base. An age estimate is difficult to assign for this category, but the point is similar to points from Cultural Layer 11 at Mummy Cave which has an average date of 6331 BC (Anderson 1989:117).

Metric Attributes

Length:	----
Width:	----
Greatest Thickness:	7.1 mm
Blade Length:	----
Blade Width:	----
Haft Width:	----
Base Width:	21.9 mm

Material Type: Quartzite

CATEGORY P3 (Figure 6.1)

Number of Artifacts: 1
Catalogue Numbers: 5LA8219.0.1

Description: The point has a missing tip, bi-convex cross-section, straight blade edges, sloping shoulders, a contracting stem, pointed tangs, and a straight base. This category is thought to date between 7200 BC to 6500 BC (Anderson 1989:118).

Metric Attributes

Length:	----
Width:	18.4 mm
Greatest Thickness:	6 mm
Blade Length:	----
Blade Width:	18.4 mm
Haft Width:	18.4 mm
Base Width:	18.4 mm

Material Types: Quartzite

CATEGORY P4 (Figure 6.1)

Number of Artifacts: 4
Catalogue Numbers: 5LA5256.0.29. 5LA8052.0.6, 5LA8255.0.2, and 5LA8264.0.1

Description: These large teardrop shaped projectile points have sharp to dull tips, bi-convex or plano-convex cross-sections, convex edges, no shoulders or stems, and convex bases. This category appears to consist largely of projectile point preforms that were discarded or lost prior to completion. Anderson (1989:119) suggests an age estimate of 5000 BC to AD 500 for these artifacts.

Metric Attributes

Length:	24 mm – 42.5 mm, mean=33.2 mm, n=2
Width:	20 mm – 29.4 mm, mean=22.9 mm, n=4
Greatest Thickness:	4.1 mm – 7 mm, mean= 5.8 mm, n=4
Blade Length:	24 mm – 42.5 mm, mean=33.2 mm, n=2
Blade Width:	21 mm – 24 mm, mean=22.1 mm, n=3
Haft Width:	21 mm – 24 mm, mean=22.1 mm, n=3
Base Width:	20 mm – 21 mm, mean=21 mm, n=3

Material Types: Fine-grained Quartzite (25%), Quartzite (25%), Chert (50%)

Large Straight-Stemmed Point Class

This class includes only two artifacts that are both in different categories. This class is one of the rarest, and constitutes only two percent of classifiable projectile point assemblage. Projectile points in this class appear to have been first manufactured during the Early Archaic period and may have continued to be made until AD 1000.

CATEGORY P7 (Figure 6.1)

Number of Artifacts: 1
Catalogue Numbers: 5LA8071.0.14

Description: The projectile point has a plano-convex cross-section, straight to irregular blade edges, rounded to abrupt shoulders, a straight stem, rounded tangs, and a convex base. This point has been heavily used, with use wear on two edges and the tip. The age estimate for this category is 3000 BC to 1000 BC (Anderson 1989:121-122).

Metric Attributes

Length:	----
Width:	16 mm
Greatest Thickness:	5 mm
Blade Length:	----
Blade Width:	16 mm
Haft Width:	7.5 mm
Base Width:	8 mm

Material Type: Quartzite

CATEGORY P9 (Figure 6.1)

Number of Artifacts: 1
Catalogue Numbers: 5LA8100.0.2

Description: The point has a missing tip, bi-convex cross-section, straight blade edges, rounded shoulders, a straight stem, rounded tangs, and a straight base. An age estimate of between 3300 BC to AD 1000 is suggested for this category (Anderson 1989:123-124).

Metric Attributes

Length:	----
Width:	24 mm
Greatest Thickness:	7.6 mm
Blade Length:	----
Blade Width:	24 mm
Haft Width:	10 mm

Base Width: 11 mm

Material Type: Argillite

Large Expanding-Stem Point Class

This common point class includes 35 projectile points in 16 categories. These artifacts constitute 35 percent of the classifiable projectile points. Projectile points in this class appear to have been manufactured over a long time span beginning as early as 5500 BC and ending as late as AD 1600.

CATEGORY P10 (Figure 6.1)

Number of Artifacts: 1
Catalogue Numbers: 5LA8239.0.2

Description: The projectile point has a sharp tip, bi-convex cross-section, concave blade edges, rounded shoulders, broad shallow side notches, a very slightly expanding to slightly expanding stem, rounded tangs, and a convex base. Anderson (1989:125) suggests that this style began in 5500 BC and continued until 3000 BC.

Metric Attributes
Length: 35 mm
Width: 20 mm
Greatest Thickness: 4.9 mm
Blade Length: 26.2 mm
Blade Width: 20 mm
Haft Width: 13.3 mm
Base Width: 14.7 mm

Material Type: Argillite

CATEGORY P12 (Figure 6.2)

Number of Artifacts: 3
Catalogue Numbers: 5LA8062.0.4, 5LA8231.0.1, 5LA8231.0.16

Description: These large points have sharp tips, bi-convex cross-sections, straight blade edges, abrupt shoulders, very slightly expanding stems, rounded tangs, and straight bases. An age estimate of 3000 BC to AD 500 (Anderson 1989:127) is suggested for this category.

Metric Attributes
Length: ----
Width: 16.6 mm – 31.3 mm, mean=24.2 mm, n=3

Greatest Thickness: 4.6 mm – 5.1 mm, mean=5.2 mm, n=3
Blade Length: ----
Blade Width: 22.6 mm – 31.3 mm, mean=25.6 mm, n=3
Haft Width: 10 mm – 13.5 mm, mean=11.2 mm, n=3
Base Width: 11.6 mm – 16.4 mm, mean=13.4 mm, n=3

Material Types: Basalt (66%), Argillite (34%)

CATEGORY P13 (Figure 6.2)

Number of Artifacts: 1
Catalogue Numbers: 5LA5269.0.1

Description: The point has a missing tip, bi-convex cross-sections, unknown blade edges, weakly barbed shoulders, a very slightly expanding stem, rounded tangs, and a concave base. An age estimate of 2500 BC to 500 BC (Anderson 1989:127-128) is suggested for this category.

Metric Attributes
Length: ----
Width: 31.2 mm
Greatest Thickness: 5 mm
Blade Length: ----
Blade Width: 31.2 mm
Haft Width: 16.2 mm
Base Width: 19 mm

Material Type: Argillite

CATEGORY P14 (Figure 6.2)

Number of Artifacts: 2
Catalogue Numbers: 5LA8088.0.3, and 5LA8280.0.4

Description: These large projectile points have sharp tips, bi-convex cross-sections, straight blade edges, rounded shoulders, very slightly expanding stems, rounded tangs, and concave bases. The age suggested for this style is 3000 BC to 500 BC (Anderson 1989:128-129).

Metric Attributes
Length: 28.6 mm, n=1
Width: 18 mm – 18.2 mm, mean=18.1 mm, n=2
Greatest Thickness: 5.3 mm – 6.1 mm, mean=5.7 mm, n=2
Blade Length: 19.8 mm, n=1
Blade Width: 18 mm – 18.2 mm, mean=18.1 mm, n=2
Haft Width: 10.7 mm – 10.8 mm, mean=10.8 mm, n=2
Base Width: 11.5 mm, n=1

Material Types: Basalt (50%), Chert (50%)

CATEGORY P18 (Figure 6.2)

Number of Artifacts: 3
Catalogue Numbers: 5LA5256.0.43, 5LA8074.0.4, 5LA8231.0.3

Description: These large points have sharp tips, bi-convex cross-sections, convex blade edges, rounded shoulders, slightly expanding stems, rounded tangs, and indented bases. The age estimate for this category is 3000 BC to 500 BC (Anderson 1989:132-133).

Metric Attributes

Length:	29 mm – 38 mm, mean=33.5 mm, n=2
Width:	18 mm – 21.6mm, mean=19.4 mm, n=3
Greatest Thickness:	5.3 mm – 6 mm, mean=5.7 mm, n=3
Blade Length:	20.5 mm – 27 mm, mean=24 mm, n=2
Blade Width:	18 mm – 21.6mm, mean=19.4 mm, n=3
Haft Width:	15.6 mm – 17 mm, mean=16.2 mm, n=3
Base Width:	16.5 mm – 19.6 mm, mean=17.7 mm, n=3

Material Types: Basalt (34%), Fine-grained Quartzite (66%)

CATEGORY P19 (Figure 6.2)

Number of Artifacts: 1
Catalogue Numbers: 5LA8217.0.11

Description: Only a single example of this type of projectile point was identified in the assemblage. It is only about 30 percent complete, and could only tentatively be assigned to Category P19. This point has a missing sharp tip, bi-convex cross-section, its blade edges were too partial to classify, abrupt shoulders, a very slightly stem, rounded tangs, and a straight base. An age estimate of 2000 BC to AD 1000 is suggested for this category, although their use may continue later in some places (Anderson 1989:134).

Metric Attributes

Length:	----
Width:	23.9 mm
Greatest Thickness:	4.4 mm
Blade Length:	----
Blade Width:	----
Haft Width:	10.5 mm
Base Width:	----

Material Type: Basalt

CATEGORY P20 (Figure 6.2)

Number of Artifacts: 2
Catalogue Numbers: 5LA8062.0.2, 5LA8108.0.2

Description: These points have bi-convex cross-sections, straight blade edges, barbed shoulders, pointed tangs, and concave bases. An age estimate of 500 BC to AD 1 is suggested for this category (Anderson 1989:136).

Metric Attributes

Length:	31 mm, n=1
Width:	12 mm – 16 mm, mean=14 mm, n=2
Greatest Thickness:	5 mm – 7 mm, mean=6 mm, n=2
Blade Length:	20 mm, n=1
Blade Width:	12 mm – 16 mm, mean=14 mm, n=2
Haft Width:	8.7 mm – 9.8 mm, mean=9.3 mm, n=2
Base Width:	12.6 mm – 15.5 mm, mean=14 mm, n=2

Material Types: Quartzite (50%), Argillite (50%)

CATEGORY P26 (Figure 6.3)

Number of Artifacts: 3
Catalogue Numbers: 5LA8050.0.5, 5LA8066.0.2, 5LA8094.0.1

Description: Points in this category have sharp tips, straight blade edges, largely bi-convex cross-sections, barbed shoulders, rounded or pointed tangs, and slightly convex bases. These points are thought to date between 1000 BC and AD 500 (Anderson 1989:143).

Metric Attributes

Length:	38.4 mm – 56.6 mm, mean=47.5 mm, n=2
Width:	17.5 mm – 28 mm, mean=23.1 mm, n=3
Greatest Thickness:	3.9 mm – 5 mm, mean=4.4 mm, n=3
Blade Length:	35 mm – 54.4 mm, mean=44.7 mm, n=2
Blade Width:	17.5 mm – 28 mm, mean=23.1 mm, n=3
Haft Width:	8.6 mm – 14 mm, mean=11.5 mm, n=3
Base Width:	11.9 mm

Material Types: Chert (66%), Argillite (34%)

CATEGORY P27 (Figure 6.3)

Number of Artifacts: 3
Catalogue Numbers: 5LA5269.0.10, 5LA8043.0.7, and 5LA8356.0.1

Description: These point bases have bi-convex cross-sections, straight blade edges, barbed shoulders, expanding stems, pointed tangs, and straight or convex bases. An age estimate of between 500 BC and AD 1000 is suggested for this category (Anderson 1989:144).

Metric Attributes
Length: ----
Width: 28 mm – 36 mm, mean=31.2 mm, n=3
Greatest Thickness: 4.6 mm – 6.2 mm, mean=5.6 mm, n=3
Blade Length: ----
Blade Width: 28 mm – 36 mm, mean=31.2mm, n=3
Haft Width: 12.2 mm – 17.4 mm, mean=14 mm, n=3
Base Width: 20 mm – 23.4 mm, mean=21.5 mm, n=3

Material Types: Quartzite (33%), Argillite (33%), Basalt (33%)

CATEGORY P28 (Figure 6.3)

Number of Artifacts: 1
Catalogue Numbers: 5LA3539.0.86

Description: Only a single example of this point style was identified in the assemblage. This point has a bi-convex cross-section, straight blade edges, barbed shoulders, a slightly expanding stem, and a straight base. Anderson (1989:145) suggests that this category dates between 2000 BC and AD 1000.

Metric Attributes
Length: ----
Width: 25.7 mm
Greatest Thickness: 7.5 mm
Blade Length: ----
Blade Width: 25.7
Haft Width: 13 mm
Base Width: 14 mm

Material Type: Quartzite

CATEGORY P29 (Figure 6.3)

Number of Artifacts: 1
Catalogue Numbers: 5LA8062.0.5

Description: A single, nearly complete example of category P29 was analyzed. This nearly complete point has a dull tip, bi-convex cross-section, I-E recurve blade edge, abrupt shoulders, an expanding stem, rounded tangs, and a convex base. An age estimate of 500 BC to AD 600 is suggested for this category (Anderson 1989:146).

Metric Attributes
Length: 33 mm
Width: 26 mm
Greatest Thickness: 5.3 mm
Blade Length: 27.5 mm
Blade Width: 26 mm
Haft Width: 11.9 mm
Base Width: 17 mm

Material Type: Argillite

CATEGORY P33 (Figure 6.4)

Number of Artifacts: 1
Catalogue Numbers: 5LA3214.0.32

Description: Only one example of this category was also identified in the chipped-stone assemblage. The point has a dull tip, bi-convex cross-section, straight blade edges, rounded shoulders, a very slightly expanding stem, rounded tangs, and a slightly concave base. This category is suggested to date between 500 BC and AD 900 (Anderson 1989:152).

Metric Attributes
Length: 25 mm
Width: 17.8 mm
Greatest Thickness: 5.5 mm
Blade Length: 17 mm
Blade Width: 17.8 mm
Haft Width: 14.9 mm
Base Width: 17 mm

Material Type: Basalt

CATEGORY P35 (Figure 6.4)

Number of Artifacts: 7
Catalogue Numbers: 5LA5269.0.4, 5LA8071.0.20, 5LA8074.0.6, 5LA8217.0.13, 5LA8220.0.1, 5LA8277.0.1, and 5LA8279.0.3

Description: Category P35 was one of the more common large point classes identified in the assemblage. All but one of the examples are made from fine-grained materials, suggesting a possible preference for low fracture-toughness materials for the manufacture of this point type. These large points have sharp tips, bi-convex cross-sections, straight or convex blade edges, abrupt shoulders, broad expanding stems, round or pointed tangs, and slightly convex bases. This category is thought to date between 1000 BC and AD 1200 (Anderson 1989:154-155).

Metric Attributes
Length: 20.4 mm – 31 mm, mean=27 mm, n=5
Width: 13.7 mm – 21 mm, mean=18.1 mm, n=7
Greatest Thickness: 3.4 mm – 4.9 mm, mean=4.3 mm, n=7
Blade Length: 20.2 mm – 24.3 mm, mean=22.8 mm, n=5
Blade Width: 13.7 mm – 21 mm, mean=18.1 mm, n=7
Haft Width: 9.9 mm – 15.2 mm, mean=11.6 mm, n=7
Base Width: 10 mm – 16.7 mm, mean=13.4 mm, n=7

Material Types: Chert (57%), Fine-grained Quartzite (14%), Quartzite (14%), Obsidian (14%)

CATEGORY P37 (Figure 6.4)

Number of Artifacts: 2
Catalogue Numbers: 5LA8052.0.4, 5LA8341.0.1

Description: These point have sharp tips, bi-convex cross-sections, straight blade edges, weakly barbed shoulders, slightly expanding stems, pointed tangs, and straight bases. An age estimate of AD 850 to AD 1100 is suggested for this category (Anderson 1989:157).

Metric Attributes
Length: 45 mm
Width: 21.5 mm – 23.6 mm, mean=22.6 mm, n=2
Greatest Thickness: 4.3 mm – 4.8 mm, mean=4.6 mm, n=2
Blade Length: 38 mm
Blade Width: 21.5 mm – 23.6 mm, mean=22.6 mm, n=2
Haft Width: 9.8 mm – 9.9 mm, mean=9.8 mm, n=2
Base Width: 12.2 mm – 13 mm, mean=12.6 mm, n=2

Material Types: Basalt (50%), Quartzite (50%)

CATEGORY P40 (Figure 6.5)

Number of Artifacts: 2
Catalogue Numbers: 5LA8057.0.1, and 5LA8279.0.1

Description: These two partial projectile points have missing tips, bi-convex cross-sections, I-E recurve blade edges, rounded shoulders, very slightly expanding stems, rounded tangs, and straight to convex base. This category is thought to date between 5100 BC and 2500 BC (Anderson 1989:159-160).

Metric Attributes
Length: ----
Width: 28.4 mm – 29 mm, mean=28.7 mm, n=2
Greatest Thickness: 6.8 mm – 6.9 mm, mean=6.8 mm, n=2

Blade Length:	----
Blade Width:	28.4 mm – 29 mm, mean=28.7 mm, n=2
Haft Width:	18 mm – 18.3 mm, mean=18.2 mm, n=2
Base Width:	21.1 mm

Material Types: Quartzite (50%), Argillite (50%)

CATEGORY P42 (Figure 6.5)

Number of Artifacts: 4
Catalogue Numbers: 5LA8052.0.5, 5LA8092.0.2, 5LA8241.0.6, and 5LA8255.0.1

Description: These points have sharp or very sharp tips, bi-convex cross-sections, straight to slightly convex blade edges, weakly barbed to barbed shoulders, expanding stems, rounded or pointed tangs, and slightly convex or straight bases. Anderson (1989:161-162) suggests an age estimate of 1500 BC to 1000 BC for these points.

Metric Attributes

Length:	30 mm – 37.5 mm, mean=33.8 mm, n=2
Width:	18.9 mm – 22 mm, mean=20 mm, n=3
Greatest Thickness:	3.7 mm – 5 mm, mean=4.5 mm, n=3
Blade Length:	26 mm – 34 mm, mean=30 mm, n=2
Blade Width:	13 mm – 15.7 mm, mean=14 mm, n=3
Haft Width:	9 mm – 10.9 mm, mean=10.2 mm, n=3
Base Width:	13 mm – 15.7 mm, mean=14 mm, n=3

Material Types: Quartzite (33%), Argillite (67%)

Large Contracting-Stem Point Class

No projectile points collected from Training Unit 7 were assigned to this class. The absence of this point class does not appear to be the result of temporal factors; these points are suggested to date from 3000 BC to 500 BC, and other point styles that are thought to date from this period were collected from the project area. These points have stems with an obtuse-angled tang. These projectile points appear to be very rare throughout the PCMS; the large assemblage examined by Anderson (1989:164) included only 4 examples of this class, or 0.8% of the total sample.

Large Flange-Stemmed Point Class

Only three of the projectile points were assigned to this class, which is 3 percent of the assemblage considered here. These points are similar to small point styles where flange-stemmed points are substantially more common. The age estimates for points in this class cover a very broad range from 6000 BC to AD 1000 (Anderson 1989).

CATEGORY P45 (Figure 6.5)

Number of Artifacts: 2
Catalogue Numbers: 5LA5256.0.12, 5LA8040.0.1

Description: These two partial projectile points have dull tips, bi-convex cross-sections, blade edges that are straight or slightly convex, abrupt shoulders, one point has a straight flange stem and one point has a slightly contracting flange stem, both exhibit pointed tangs, and the bases are indented. An age estimate of 3000 BC to 300 BC is suggested for this category (Anderson 1989:167).

Metric Attributes

Length:	----
Width:	15.7 mm – 17.9 mm, mean=16.8 mm, n=2
Greatest Thickness:	2.2 mm – 3 mm, mean=2.6 mm, n=2
Blade Length:	----
Blade Width:	13.5 mm – 14 mm, mean=13.8 mm, n=2
Haft Width:	9.8 mm – 10.2 mm, mean=10 mm, n=2
Base Width:	15.7 mm – 17.9 mm, mean=16.8 mm, n=2

Material Types: Chert

CATEGORY P47 (Figure 6.5)

Number of Artifacts: 1
Catalogue Numbers: 5LA8020.0.1

Description: Only a single, nearly complete (98 percent) projectile point was assigned to category P47. This point has a sharp tip, a bi-convex cross-section, convex blade edges, sloping shoulders, a flange stem, rounded tangs, and a concave base. An age estimate of 3300 BC to AD 1000 is suggested for this style (Anderson 1989:168-169).

Metric Attributes

Length:	45 mm
Width:	21.4 mm
Greatest Thickness:	6.6 mm
Blade Length:	34 mm
Blade Width:	21.1 mm
Haft Width:	16.4 mm
Base Width:	21.1 mm

Material Type: Quartzite

Small Unstemmed Point Class

A total of 16 artifacts were assigned to this class. This relatively common class comprises 16 percent of the classifiable projectile point assemblage. Examples of three of the four categories in this class were identified in the assemblage from Training Unit 7. Most if not all of the artifacts in this class may have been unfinished projectile points that were discarded or lost prior to completion. Only mid- to late-stage point preforms were assigned to this class; other small point preforms are present in the assemblage, and this class does not include all of the small projectile point preforms. Although it is also possible that some of these artifacts were used to tip projectiles, artifacts in this class are thicker on average than other small point styles and they frequently have step fractures or other aspects that preclude further thinning. Both of these observations support the suggestion that these artifacts are generally mid- to late-stage preforms, which were discarded or lost prior to completion.

CATEGORY P48 (Figure 6.6)
Number of Artifacts: 6
Catalogue Numbers: 5LA8022.0.3, 5LA8104.0.21, 5LA8109.0.1, 5LA8249.0.3, 5LA8250.0.4, and 5LA8261.0.1

Description: Artifacts in this category exhibit a considerable range of variation in morphological characteristics, which is probably a result of the unfinished character of these artifacts. These small points have very sharp tips to dull tips, cross-sections are bi-convex or plano-convex, blade edges are straight or irregular; the points lack stems or shoulders, bases are convex, and the tangs are rounded. Anderson (1989:170-171) suggests that these points were made between AD 500 and AD 1400, but were most common between AD 1000 and AD 1400.

Metric Attributes

Length:	16 mm – 29.4 mm, mean=24.6 mm, n=6
Width:	13.3 mm – 26 mm, mean=17.7 mm, n=6
Greatest Thickness:	2.7 mm – 7.2 mm, mean=4.9 mm, n=6
Blade Length:	16 mm – 29.4 mm, mean=24.6 mm, n=6
Blade Width:	13.3 mm – 26 mm, mean=17.7 mm, n=6
Haft Width:	13.3 mm – 26 mm, mean=17.7 mm, n=6
Base Width:	13.3 mm – 26 mm, mean=17.7 mm, n=6

Material Types: Chert (17%), Argillite (50%), Fine-grained quartzite (33%)

CATEGORY P49 (Figure 6.7)

Number of Artifacts: 8
Catalogue Numbers: 5LA8071.0.9, 5LA8222.0.9, 5LA8222.0.10, 5LA8232.0.2, 5LA8265.0.1, 5LA8266.0.11, 5LA8274.0.1, and 5LA8279.0.5

Description: As is the case with most other categories in this class, Category P49 was relatively common, and the artifacts exhibited considerable morphological variation. Surprisingly, all of

the points in this class were fragmentary; the tips of all eight examples were missing. These artifacts have sharp to very sharp tips, cross-sections are bi-convex or plano-convex, blade edges are straight to convex, the points lack stems or shoulders, and bases are straight or concave. Anderson (1989:174-175) suggests that these points were made between AD 800 and AD 1750, but may date as early as 200 BC.

Metric Attributes
Length: ----
Width: 13.2 mm – 18 mm, mean=14.9 mm, n=7
Greatest Thickness: 3.3 mm – 5.5 mm, mean=3.9 mm, n=8
Blade Length: ----
Blade Width: 13.2 mm – 18 mm, mean=14.9 mm, n=7
Haft Width: 13.2 mm – 18 mm, mean=14.9 mm, n=7
Base Width: 9 mm – 17.3 mm, mean=14.4 mm, n=5

Material Types: Chert (37%), Chalcedony (13%), Quartzite (50%)

CATEGORY P50 (Figure 6.7)

Number of Artifacts: 2
Catalogue Numbers: 5LA8058.0.7, and 5LA8071.0.24

Description: These points have sharp tips, bi-convex or plano-convex cross-sections, irregular or straight blade edges, no stems or shoulders, pointed or rounded tangs (n=1), and they all have concave bases. Anderson (1989:175-176) suggests an age estimate of AD 1000 to AD 1750 for this class.

Metric Attributes
Length: ----
Width: 11.2 mm – 12.1 mm, mean=11.7 mm, n=2
Greatest Thickness: 3 mm – 4 mm, mean=3.5 mm, n=2
Blade Length: ----
Blade Width: 11.2 mm – 12.1 mm, mean=11.7 mm, n=2
Haft Width: 11.2 mm – 12.1 mm, mean=11.7 mm, n=2
Base Width: 11.2 mm – 12.1 mm, mean=11.7 mm, n=2

Material Types: Chert (50%), Basalt (50%)

Small Straight-Stemmed Point Class

A total of only two artifacts in a single category were assigned to this class. These artifacts constitute just 2 percent of the classifiable projectile point assemblage. This class of projectile points was also relatively rare in the larger assemblage which was used to develop the Anderson typology, accounting for just 4.9 percent of the total (Anderson 1989:177). Projectile points in this class appear to have been manufactured between AD 700 and AD 1400 (Anderson 1989).

CATEGORY P52 (Figure 6.7)

Number of Artifacts: 2
Catalogue Numbers: 5LA8091.0.4, 5LA8231.0.4

Description: Although only two points were assigned to this category, relatively substantial variation exists in their morphological characteristics. These points have very sharp tips, bi-convex or plano-convex cross-sections, convex or straight blade edges, rounded or abrupt or weakly barbed shoulders, rounded or pointed tangs, and convex or straight or concave bases.

Metric Attributes

Length:	23 mm
Width:	12 mm – 13 mm, mean=12.5 mm, n=2
Greatest Thickness:	2.9 mm
Blade Length:	19.7 mm
Blade Width:	12 mm – 13 mm, mean=12.5 mm, n=2
Haft Width:	6.2 mm – 7.5 mm, mean=6.9 mm, n=2
Base Width:	6.2 mm – 8.9 mm, mean=7.6 mm, n=2

Material Types: Chert (100%)

Small Expanding-Stem Point Class

This class includes small corner-notched projectile points. A total of 14 artifacts in seven different categories were assigned to this class. Half of the points in this class were assigned to a single type (P58), two points were assigned to another type (P59), and the remaining five types each only had a single example. Artifacts in this class appear to have been manufactured for a long period of time-- they may date from the end of the Late Archaic period to the Historic period.

CATEGORY P58 (Figure 6.8)

Number of Artifacts: 7
Catalogue Numbers: 5LA5256.0.2, 5LA8052.0.7, 5LA8110.0.1, 5LA8140.0.1, 5LA8217.0.14, 5LA8225.0.1, and 5LA8258.0.2

Description: Artifact catalogue number 5LA8052.0.7 is larger than other points in this class and is possibly misclassified. These artifacts were made from an unusually wide range of materials. These projectile points have very sharp tips, most have bi-convex cross-sections but two examples have plano-convex cross-sections, blade edges are straight or convex, shoulders are weakly barbed to barbed, stems are slightly expanding or expanding, and the bases are straight or slightly convex. An age estimate of AD 600 to AD 1200 is suggested for this category (Anderson 1989:184-187).

Metric Attributes
Length: 18 mm – 31.6 mm, mean=22.8 mm, n=6
Width: 10 mm – 16 mm, mean=12.5 mm, n=7
Greatest Thickness: 2.2 mm – 4 mm, mean=3 mm, n=7
Blade Length: 13.7 mm – 25.2 mm, mean=18.8 mm, n=6
Blade Width: 10 mm – 16 mm, mean=12.5 mm, n=7
Haft Width: 5.2 mm – 10.4 mm, mean=7.2 mm, n=7
Base Width: 8.9 mm- 13.2 mm, mean=10 mm, n=6

Material Types: Chert (14%), Fine-grained Quartzite (29%), Chalcedony (14%), Silicified Wood (29%), Argillite (14%)

CATEGORY P59 (Figure 6.8)

Number of Artifacts: 2
Catalogue Numbers: 5LA8100.0.1, 5LA8258.0.1

Description: These projectile points have sharp tips, bi-convex cross-sections, straight blade edges, weakly barbed shoulders, expanding stems, pointed tangs, and straight bases. Anderson (1989:188-190) suggests an age estimate of AD 500 to AD 1200 for these points.

Metric Attributes
Length: 23.5 mm
Width: 12.4 mm – 13.8 mm, mean=13.1 mm, n=2
Greatest Thickness: 2.3 mm – 2.9 mm, mean=2.6 mm, n=2
Blade Length: 20 mm
Blade Width: 12.4 mm – 13.8 mm, mean=13.1 mm, n=2
Haft Width: 4.9 mm – 5.5 mm, mean=5.2 mm, n=2
Base Width: 8 mm

Material Types: Chert (50%), Argillite (50%)

CATEGORY P60 (Figure 6.8)

Number of Artifacts: 1
Catalogue Numbers: 5LA8044.0.1

Description: Only a single, nearly complete example of this projectile point category was identified in the assemblage. The projectile point has a sharp tip, bi-convex cross-section, straight blade edges, extended barb shoulders, a very slightly expanding stem, pointed tangs, and a missing base. Anderson (1989:190-192) suggests an age estimate of AD 500 to AD 1300 for these points.

Metric Attributes
Length: 25 mm
Width: 14.9 mm

Greatest Thickness: 2.4 mm
Blade Length: 21 mm
Blade Width: 14.9 mm
Haft Width: 4.7 mm
Base Width: 5.2 mm

Material Type: Chalcedony

CATEGORY P61 (Figure 6.9)

Number of Artifacts: 1
Catalogue Numbers: 5LA8052.0.2

Description: Only one example of this projectile point category was identified in the assemblage. The large projectile point assemblage from the Black Hills also included only a single example, made from obsidian, of this point style (Owens et al. 2000:268). Given the relative rarity of obsidian points in the PCMS, it is probably more than chance that these two points were made from obsidian. Several possible explanations can be offered. First, it is possible that these points were brought to the area as finished artifacts that were made elsewhere. Second, the same individual may have made both points. Third, the fracture characteristics of obsidian may have contributed to the similar appearance of the artifacts. This projectile point has a missing tip, bi-convex cross-section, straight blade edges, abrupt shoulders, an expanding stem, pointed tangs, and a straight base. This category is thought to date between AD 270 and AD 1400 (Anderson 1989:192-193).

Metric Attributes
Length: ----
Width: 14 mm
Greatest Thickness: 3.9 mm
Blade Length: ----
Blade Width: 14 mm
Haft Width: 10.4 mm
Base Width: 13 mm

Material Type: Obsidian

CATEGORY P66 (Figure 6.9)

Number of Artifacts: 1
Catalogue Numbers: 5LA8239.0.1

Description: As is the case with most of the categories in this point class, a single example was identified. The point has a missing tip, bi-planar cross-section, slightly convex blade edges, rounded shoulders, an expanding stem, rounded tangs, and a slightly convex base. The category is thought to date between AD 800 and AD 1450 (Anderson 1989:199-200).

Metric Attributes
Length: ----
Width: 13.2 mm
Greatest Thickness: 2.5
Blade Length: ----
Blade Width: 13.2 mm
Haft Width: 7.9 mm
Base Width: 11.7 mm

Material Types: Chert

CATEGORY P69 (Figure 6.9)

Number of Artifacts: 1
Catalogue Numbers: 5LA8043.0.13

Description: The only example of a P69 style projectile was a nearly complete basalt point, which is somewhat large for a small point style and could possibly be misclassified. This point has a very sharp tip, a plano-convex cross-section, concave blade edges, abrupt shoulders, a slightly expanding stem, rounded tangs, and a nearly straight base. No age estimate is suggested for this category, but they may date to the Plains Woodland period or circa AD 200 to AD 800/1000 (Anderson 1989:203).

Metric Attributes
Length: 32 mm
Width: 15 mm
Greatest Thickness: 4.9 mm
Blade Length: 26.5 mm
Blade Width: 15 mm
Haft Width: 11.2 mm
Base Width: 13 mm

Material Type: Basalt

CATEGORY P70 (Figure 6.9)

Number of Artifacts: 1
Catalogue Numbers: 5LA8074.0.3

Description: The only example of a P70 style projectile was a nearly complete basalt point. This point has a very sharp tip, a plano-convex cross-section, concave blade edges, abrupt shoulders, a slightly expanding stem, rounded tangs, and a nearly straight base. No age estimate is suggested for this category, but they may date to the Plains Woodland period or circa AD 200 to AD 800/1000 (Anderson 1989:204).

Metric Attributes
Length: 19 mm
Width: 14 mm
Greatest Thickness: 3 mm
Blade Length: 16 mm
Blade Width: 14 mm
Haft Width: 5.6 mm
Base Width: 7.8 mm

Material Type: Basalt

Small Contracting-Stem Point Class

No examples from this point class were identified in the assemblage. This class appears to be rare throughout the PCMS, and the class also constituted only 1.1% of the point assemblage considered by Anderson (1989:208). Contracting-stem projectile points were also not identified in the large point assemblage. The extreme rarity of this stem style suggests that it may have been intentionally avoided as a result of functional concerns. A contracting stem would tend to split the shaft of projectiles on impact, which in some cases may have been desirable (e.g., warfare points), but in other instances this may have been undesirable (e.g., hunting points). Ethnographic research suggests that warfare projectile points were manufactured so that they tended to detach from the shaft upon impact, whereas hunting point were designed such that they would remain attached to the shaft after impact (Mails 1995). Historic period iron points that were intended for warfare were frequently made with contracting stems (Mails 1995).

Small Flanged-Stem Point Class

A total of 19 artifacts in five different categories were assigned to this class. This class of projectile points is one of the most common, accounting for 19 percent of the classifiable projectile points; and it includes some of the most recent point styles in the assemblage, which may, in part, account for the abundance of this point class. These artifacts date largely from the end of the Early Late Prehistoric Period to the Protohistoric Period.

CATEGORY P79 (Figure 6.9)

Number of Artifacts: 6
Catalogue Numbers: 5LA8043.0.10, 5LA8049.0.1, 5LA8071.0.28, 5LA8088.0.4, 5LA8219.0.2, and 5LA8222.0.12

Description: These points have very sharp tips, bi-convex or plano-convex cross-sections, straight blade edges, abrupt shoulders, expanding flange stems, pointed tangs, and straight or concave bases. These projectile points appear to date between AD 1000 and AD 1750 (Anderson 1989:211-213).

Metric Attributes
Length: 18.9 mm – 30 mm, mean=23.4 mm, n=3
Width: 14.9 mm – 17 mm, mean=15.6 mm, n=5
Greatest Thickness: 2.4 mm – 3.9 mm, mean=3.1 mm, n=6
Blade Length: 13 mm – 23.5 mm, mean=16.8 mm, n=3
Blade Width: 11 mm – 15.2 mm, mean=12.4 mm, n=6
Haft Width: 6 mm – 11.2 mm, mean=9.4 mm, n=6
Base Width: 14.8 mm – 17 mm, mean=15.7 mm, n=4

Material Types: Chert (17%), Fine-grained Quartzite (33%), Basalt (17%), Silicified Wood (17%), Quartzite (17%)

CATEGORY P80 (Figure 6.10)

Number of Artifacts: 5
Catalogue Numbers: 5LA5256.0.34, 5LA8058.0.8, 5LA8071.0.1, 5LA8102.0.1, and 5LA8224.0.6

Description: All five of the projectile points in this category were more than 90 percent complete, and each of the points was made from a different material type. The points assigned to this category have very sharp to sharp tips, bi-convex cross-sections, straight blade edges, abrupt shoulders, a expanding flange stems, pointed tangs, and a straight to slightly concave bases. Anderson (1989:213-214) suggests that this category dates between AD 1000 and AD 1750.

Metric Attributes
Length: 12.8 mm – 16 mm, mean=15 mm, n=5
Width: 12.5 mm – 15.4 mm, mean=13.6 mm, n=5
Greatest Thickness: 1.9 mm – 2.9 mm, mean=2.4 mm, n=5
Blade Length: 6.4 mm – 9.4 mm, mean=8.6 mm, n=5
Blade Width: 7 mm – 11 mm, mean=8.9 mm, n=5
Haft Width: 5 mm – 8.1 mm, mean=6.9 mm, n=5
Base Width: 12.5 mm – 15.4 mm, mean=13.6 mm, n=5

Material Types: Chert (20%), Fine-grained Quartzite (20%), Quartzite (20%), Argillite (20%), and Silicified Wood (20%)

CATEGORY P83 (Figure 6.11)

Number of Artifacts: 5
Catalogue Numbers: 5LA8107.0.1, 5LA8149.0.1, 5LA8222.0.6, 5LA8224.0.3, and 5LA8266.0.12

Description: These side-notched points have very sharp tips, bi-convex or plano-convex cross-sections, straight or convex blade edges, abrupt shoulders, straight flange stems, pointed tangs, and straight or concave bases. These projectile points appear to date between AD 750 and AD 1650 (Anderson 1989:217-221).

Metric Attributes
Length: 13.5 mm – 26 mm, mean=21.5 mm, n=3
Width: 10.6 mm – 16.9 mm, mean=13.1 mm, n=5
Greatest Thickness: 2.4 mm – 3.8 mm, mean=3 mm, n=6
Blade Length: 5.1 mm – 20 mm, mean=14.7 mm, n=3
Blade Width: 10.1 mm – 15.9 mm, mean=12 mm, n=6
Haft Width: 5 mm – 9.7 mm, mean=7.2, n=5
Base Width: 10.6 mm – 16.9 mm, mean=13.1 mm, n=5

Material Types: Chert (17%), Fine-grained Quartzite (17%), Quartzite (17%), Argillite (50%)

CATEGORY P84 (Figure 6.11)

Number of Artifacts: 1
Catalogue Numbers: 5LA8259.0.1

Description: The single example of this artifact type has a sharp tip, bi-convex cross-section, straight blade edges, abrupt shoulders, a straight flange stem, and pointed tangs.

Metric Attributes
Length: 14.9 mm
Width: 10.6 mm
Greatest Thickness: 2.7 mm
Blade Length: 10.6 mm
Blade Width: 10.6 mm
Haft Width: 6.6 mm
Base Width: 10.6 mm

Material Type: Fine-grained Quartzite

CATEGORY P85 (Figure 6.11)

Number of Artifacts: 1
Catalogue Numbers: 5LA8099.0.1

Description: Only one obsidian example of a category P85 was recorded in the assemblage. This projectile point has a sharp tip, bi-convex cross-section, straight edges, abrupt shoulders, expanding flange stem, rounded tangs, and a convex base. An age estimate of AD 1000 to AD 1400 is suggested for this category (Anderson 1989:222-224).

Metric Attributes:
Length: ----
Width: 14.2 mm

Greatest Thickness: 3 mm
Blade Length: ----
Blade Width: 13.2 mm
Haft Width: 11.9 mm
Base Width: 14.2 mm

Material Type: Obsidian

Cores and Core Tools

The core and core-tool class consists of 125 non-bipolar cores, 27 core-tools, and two bipolar cores. For the purposes of this analysis, tested cobbles are added to this class. Cores, core-tools, and tested cobbles were recovered from the surface of 59 sites; 31 sites have more than one core in the tool assemblage. Twenty-six percent of the assemblage has been fragmented or used to exhaustion; most (86%) artifacts are large in size, with fewer medium (13%), and small (1%) items. Heat exposure is visible in 1% of the assemblage. Table 6.13 presents the data on lithic material type for the cores and core tools.

Table 6.13: Material Types for the Cores and Core-Tools

Material	Core Class			
	Core-Tool	Non-Bipolar Core	Bipolar Core	Total
Argillite	5	29	1	35
Chert	4	13	0	17
Fine-grained Quartzite	1	3	0	4
Hornfels/Basalt	11	61	0	72
Limestone	0	1	0	1
Quartz	0	2	0	2
Coarse-grained Quartzite	5	15	1	21
Silicified Wood	1	1	0	2
Total	27	125	2	154

Non-bipolar cores are identified as a mass of raw material with patterned or unpatterned flake detachment from at least one direction. Bipolar cores (those with impact fractures in both ends) fall into a separate category. A total of eight material types were observed, all of which can be found locally in the PCMS. Microcrystalline materials dominate the assemblage (75%) and include hornfels/basalt, argillite, fine-grained quartzite, and limestone. The cryptocrystalline materials (13%) are chert, quartz, and silicified wood; the macrocrystalline cores (12%) are coarse-grained quartzite. The majority of the cores are large in size (87%) and display cortex (70%). Two of the cores show a red color change and crazing from heat exposure.

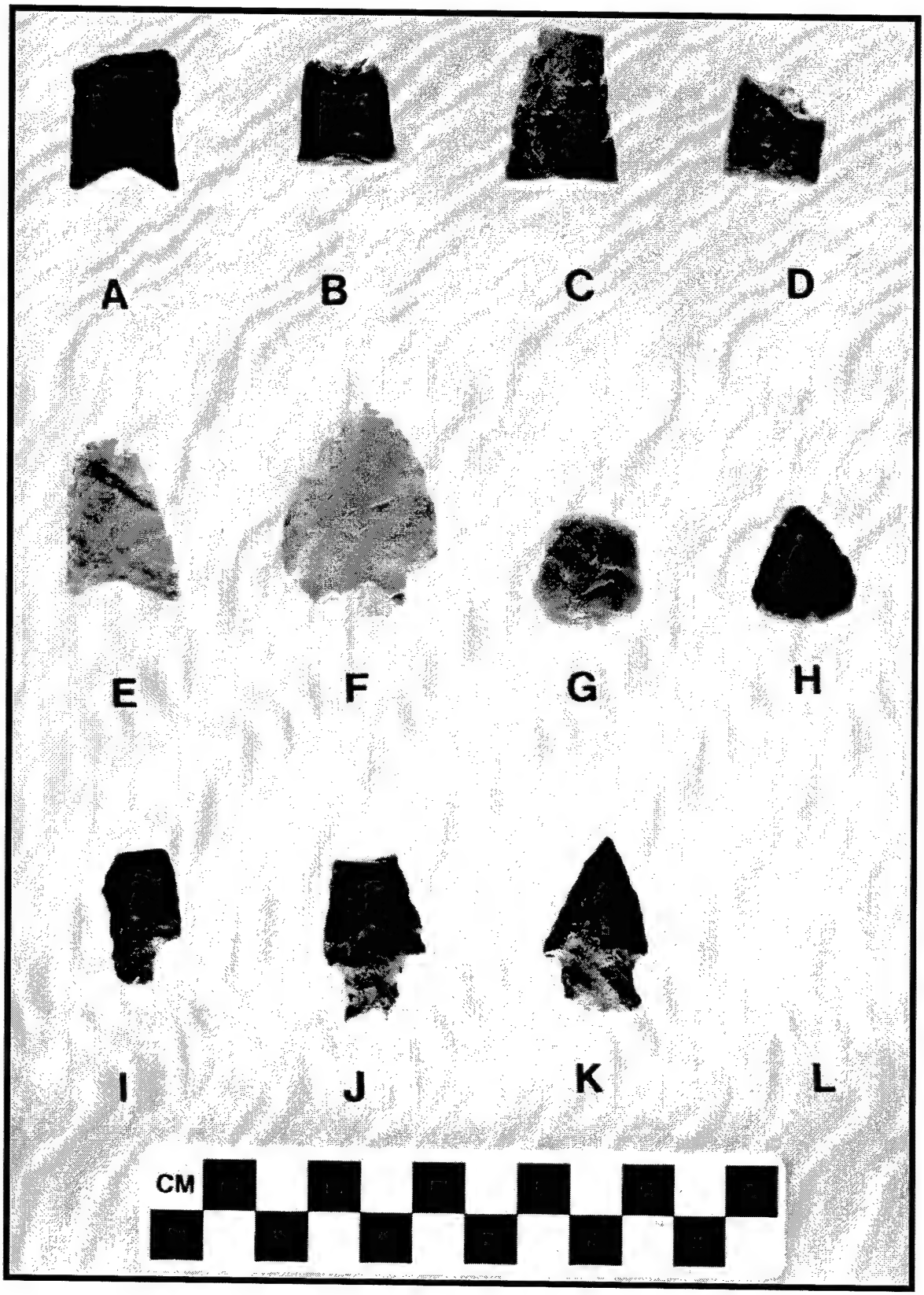


Figure 6.1. Diagnostic Projectile Points: A- 5LA8023.0.4; B- 5LA8024.0.1; C- 5LA8268.0.1; D- 5LA8219.0.1; E- 5LA5256.0.29; F- 5LA8052.0.6; G- 5LA8255.0.2; H- 5LA8264.0.1; I- 5LA8071.0.14; J- 5LA8100.0.2; K- 5LA8239.0.2

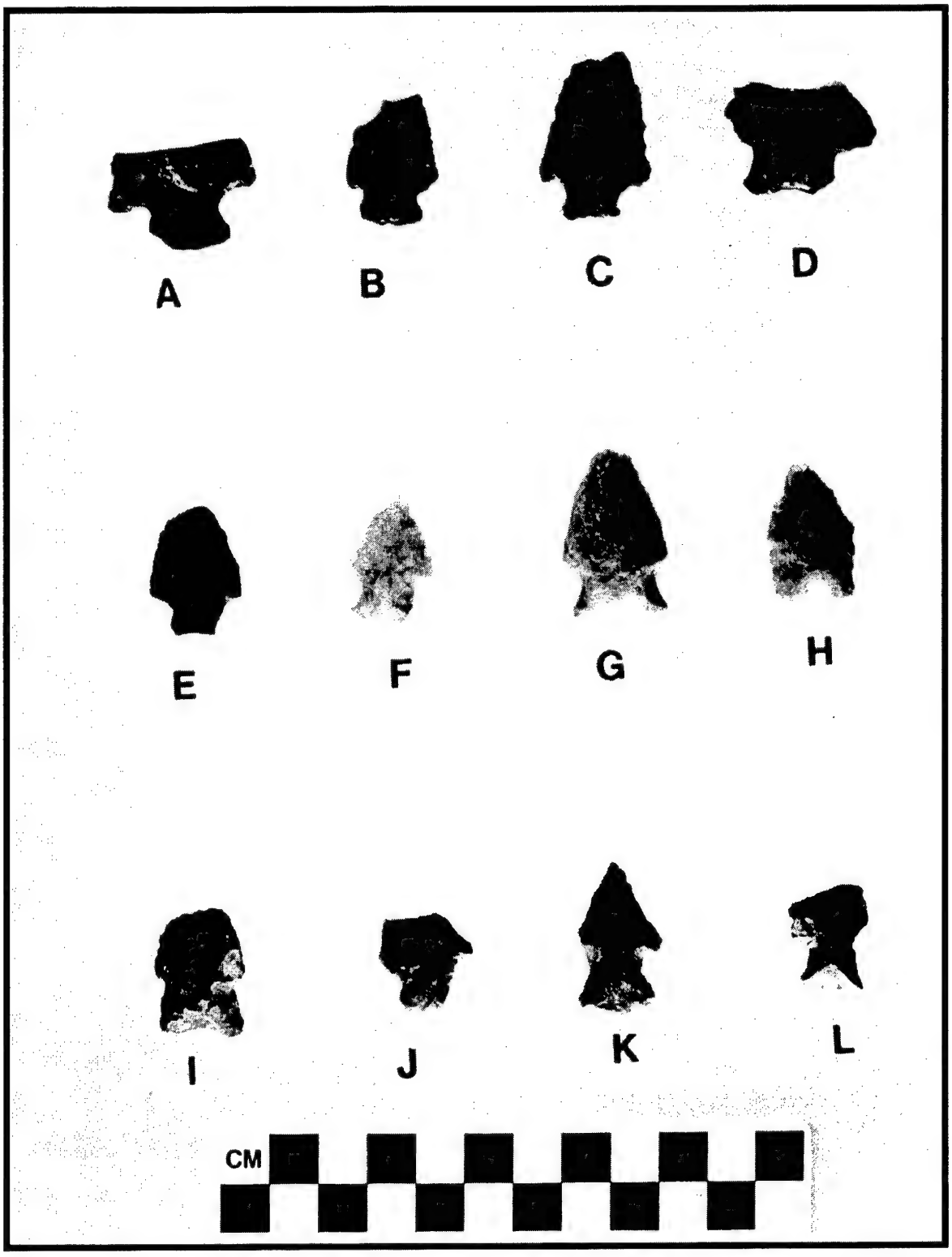


Figure 6.2. Diagnostic Projectile Points: A- 5LA8062.0.4; B- 5LA8231.0.1; C- 5LA8231.0.16; D- 5LA5269.0.1; E- 5LA8088.0.3; F- 5LA8280.0.4; G- 5LA5256.0.43; H- 5LA8074.0.4; I- 5LA8231.0.3; J- 5LA8217.0.11; K- 5LA8062.0.2; L- 5LA8108.0.2

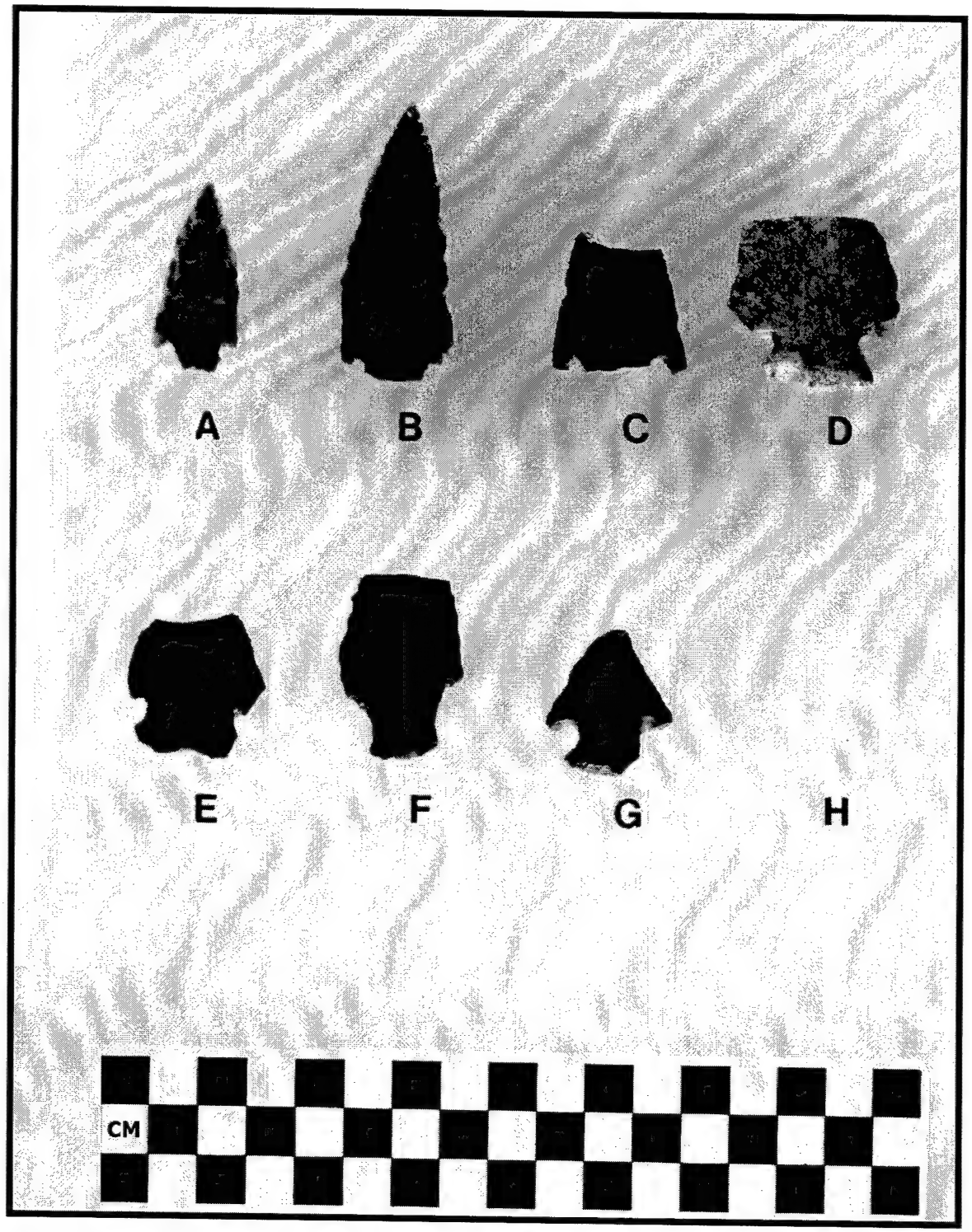


Figure 6.3. Diagnostic Projectile Points: A- 5LA8050.0.5; B- 5LA8066.0.2; C- 5LA8094.0.1; D- 5LA5269.0.10; E- 5LA8043.0.7; F- 5LA3539.0.86; G- 5LA8062.0.5

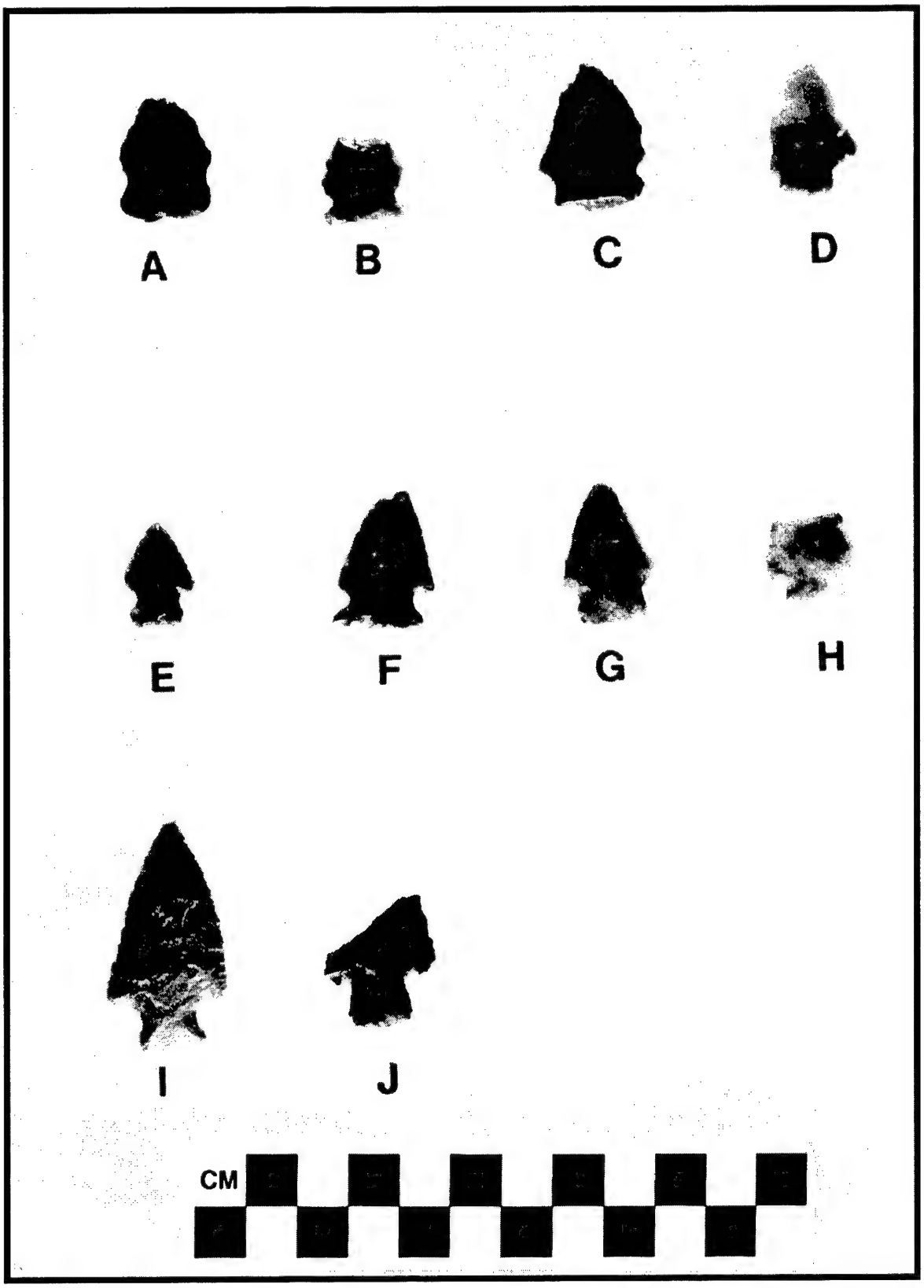


Figure 6.4. Diagnostic Projectile Points: A- 5LA3214.0.32; B- 5LA5269.0.4; C- 5LA8071.0.20; D- 5LA8074.0.6; E- 5LA8217.0.13; F- 5LA8220.0.1; G- 5LA8277.0.1; H- 5LA8279.0.3; I- 5LA8052.0.4; J- 5LA8341.0.1

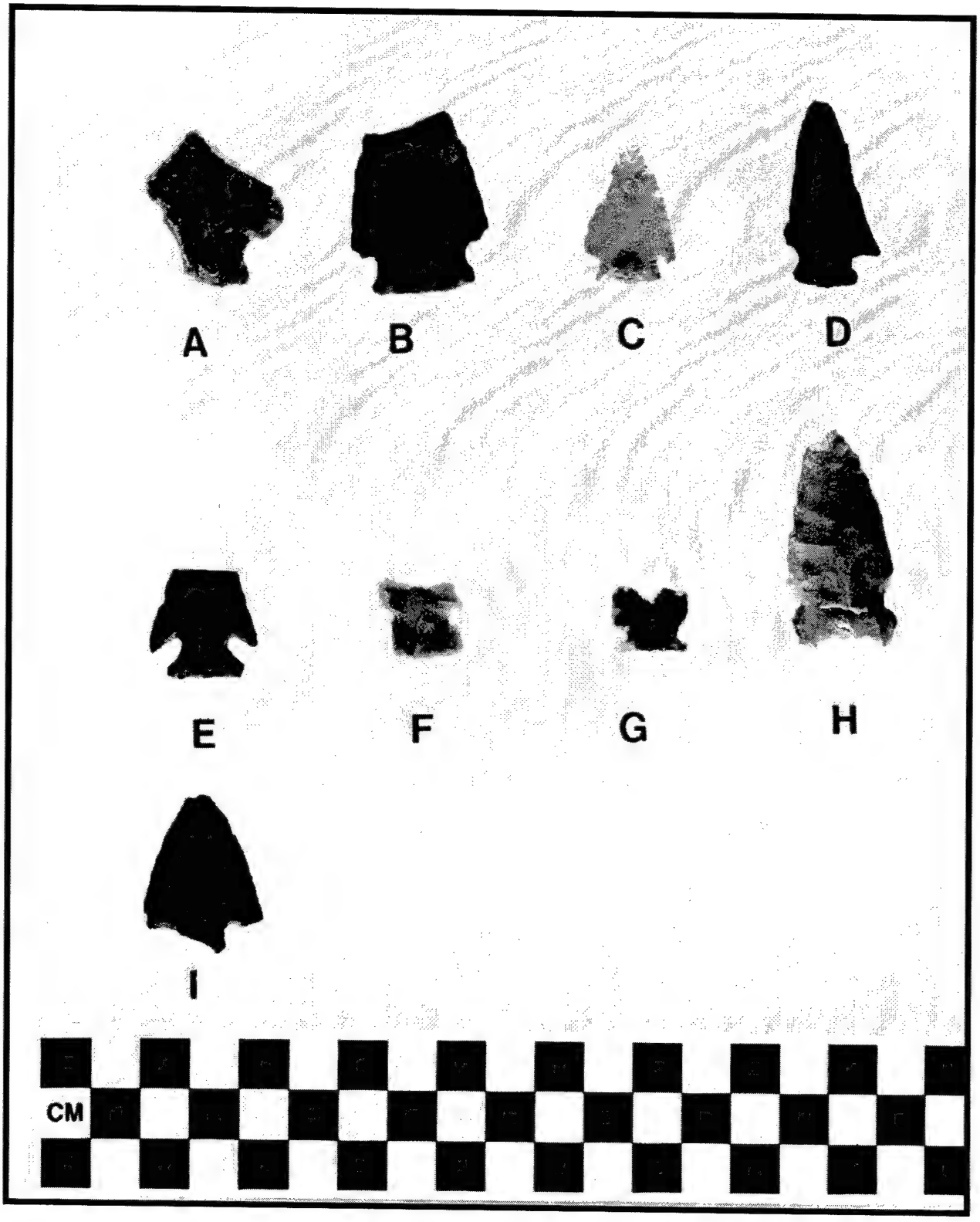


Figure 6.5. Diagnostic Projectile Points: A- 5LA8057.0.1; B- 5LA8279.0.1; C- 5LA8052.0.5; D- 5LA8092.0.2; E- 5LA8255.0.1; F- 5LA5256.0.12; G- 5LA8040.0.1; H- 5LA8020.0.1; I- 5LA8241.0.6

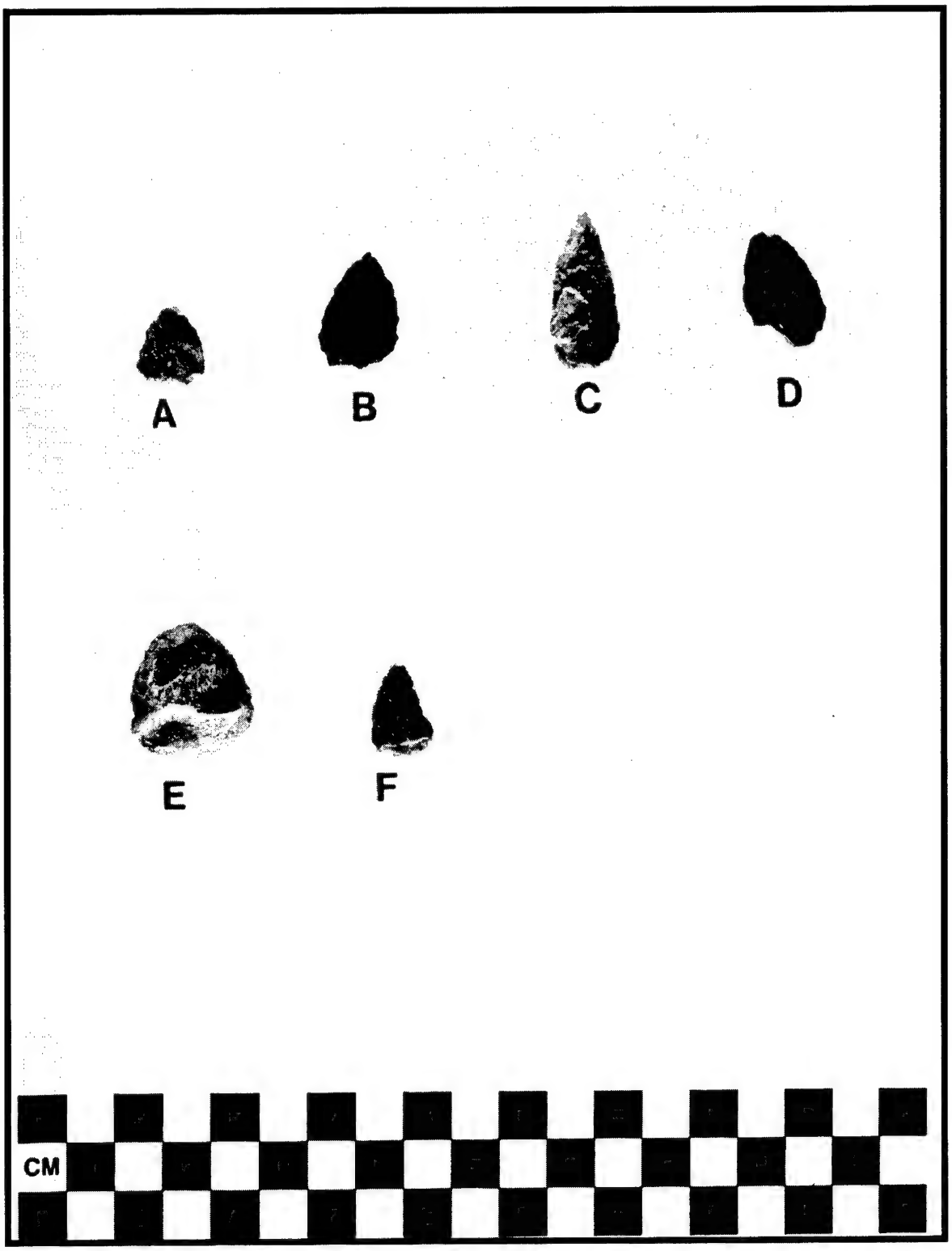


Figure 6.6. Diagnostic Projectile Points: A- 5LA8022.0.3; B- 5LA8104.0.21; C- 5LA8109.0.1; D- 5LA8249.0.3; E- 5LA8250.0.4; F- 5LA8261.0.1

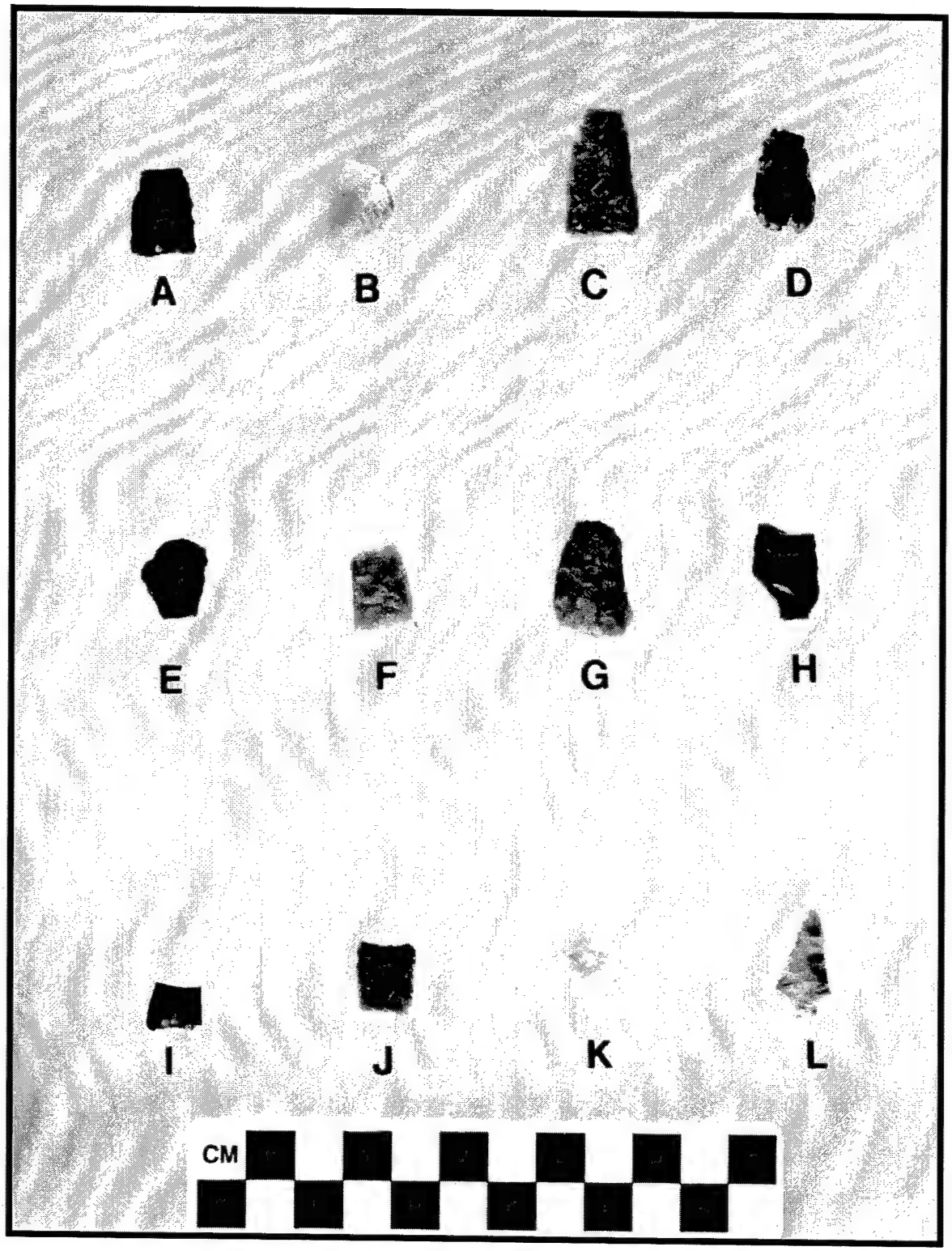


Figure 6.7. Diagnostic Projectile Points: A- 5LA8071.0.9; B- 5LA8222.0.9; C- 5LA8222.0.10; D- 5LA8232.0.2; E- 5LA8265.0.1; F- 5LA8266.0.11; G- 5LA8274.0.1; H- 5LA8279.0.5; I- 5LA8058.0.7; J- 5LA8071.0.24; K- 5LA8091.0.4; L- 5LA8231.0.4

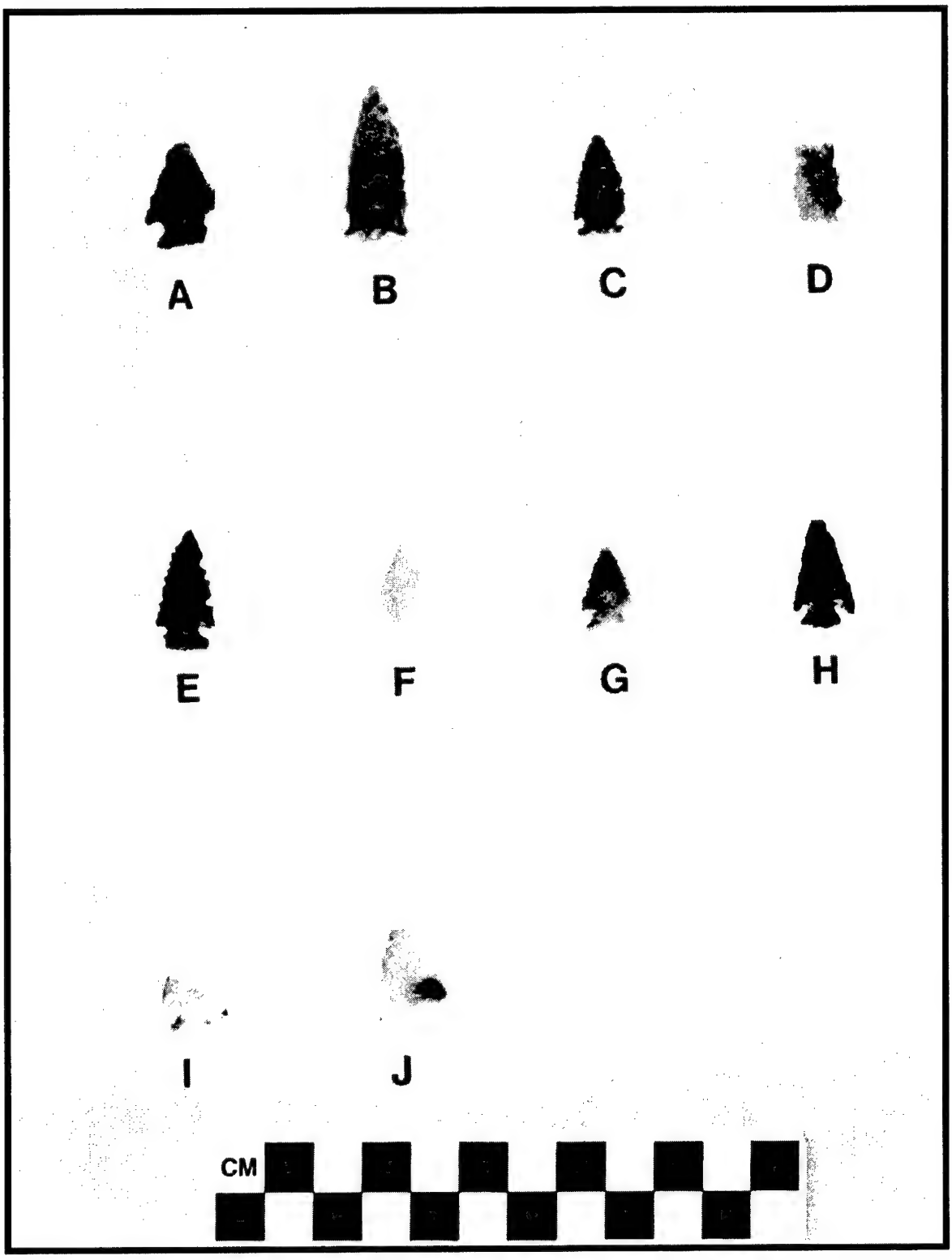


Figure 6.8. Diagnostic Projectile Points: A- 5LA5256.0.2; B- 5LA8052.0.7; C- 5LA8110.0.1; D- 5LA8140.0.1; E- 5LA8217.0.14; F- 5LA8225.0.1; G- 5LA8258.0.2; H- 5LA8100.0.1; I- 5LA8258.0.1; J- 5LA8044.0.1

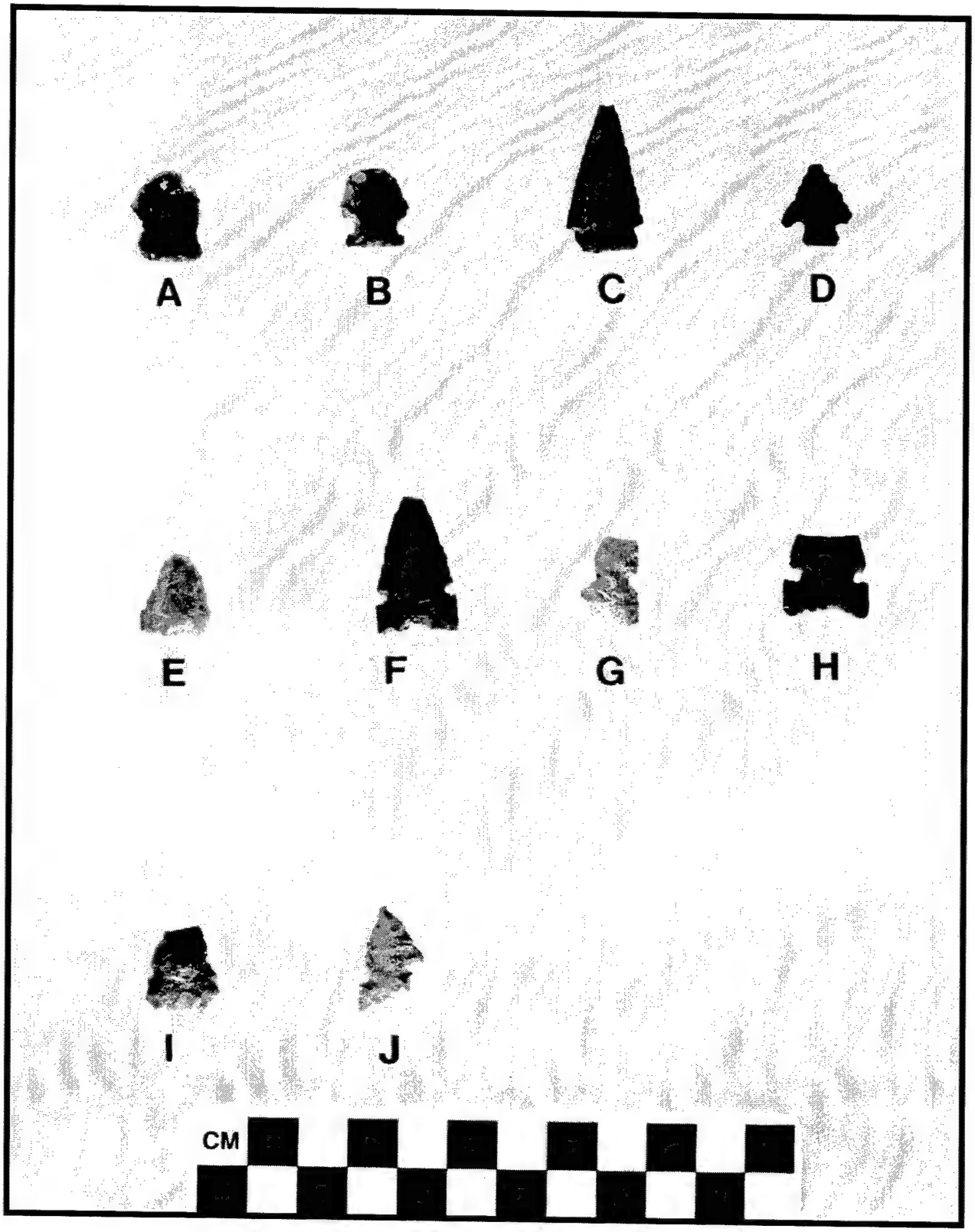


Figure 6.9. Diagnostic Projectile Points: A- 5LA8052.0.2; B- 5LA8239.0.1; C- 5LA8043.0.13; D- 5LA8074.0.3; E- 5LA8043.0.10; F- 5LA8049.0.1; G- 5LA8071.0.28; H- 5LA8088.0.4; I- 5LA8219.0.2; J- 5LA8222.0.12

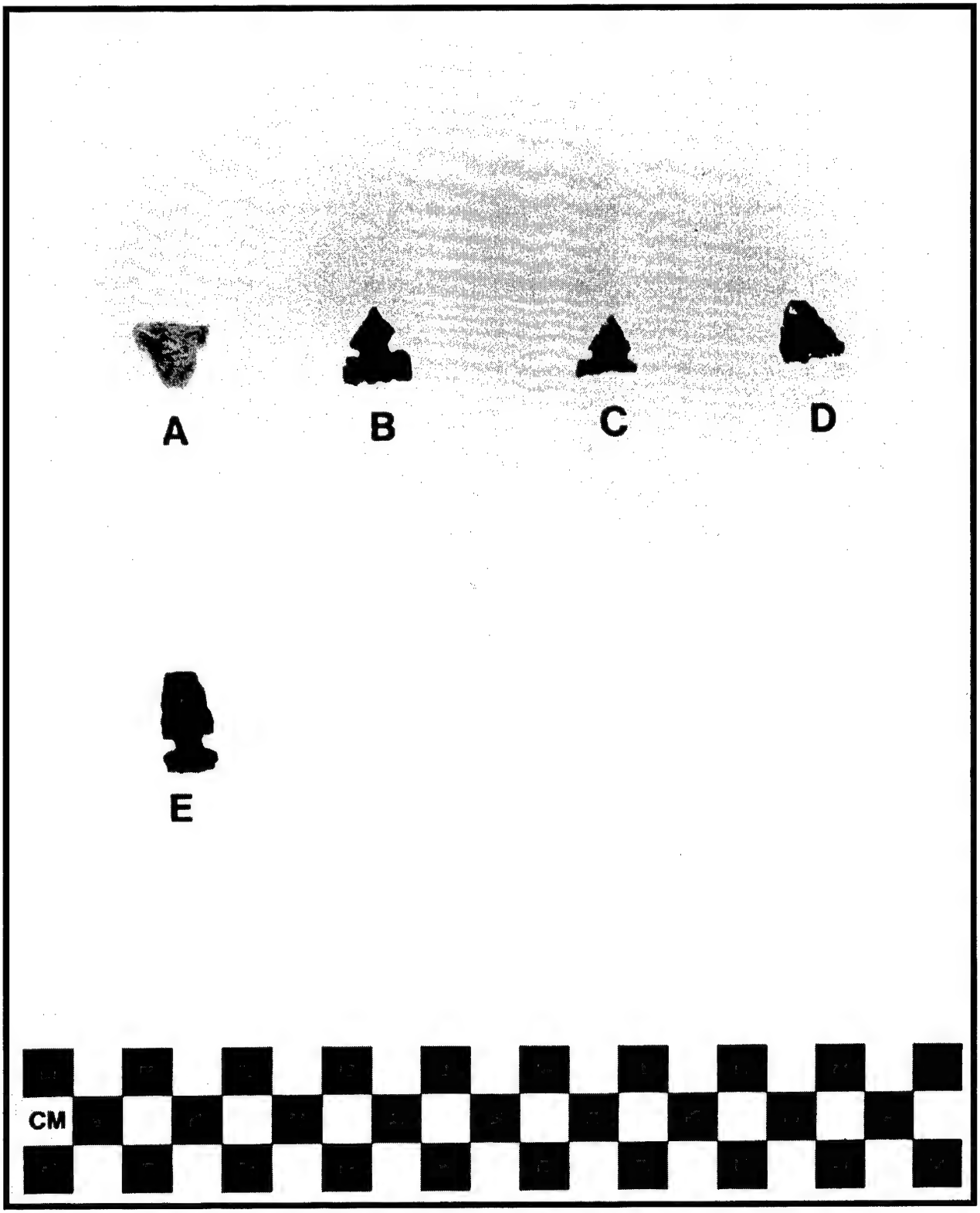


Figure 6.10. Diagnostic Projectile Points: A- 5LA5256.0.34; B- 5LA8058.0.8;C- 5LA8071.0.1; D- 5LA8102.0.1; E- 5LA8224.0.6

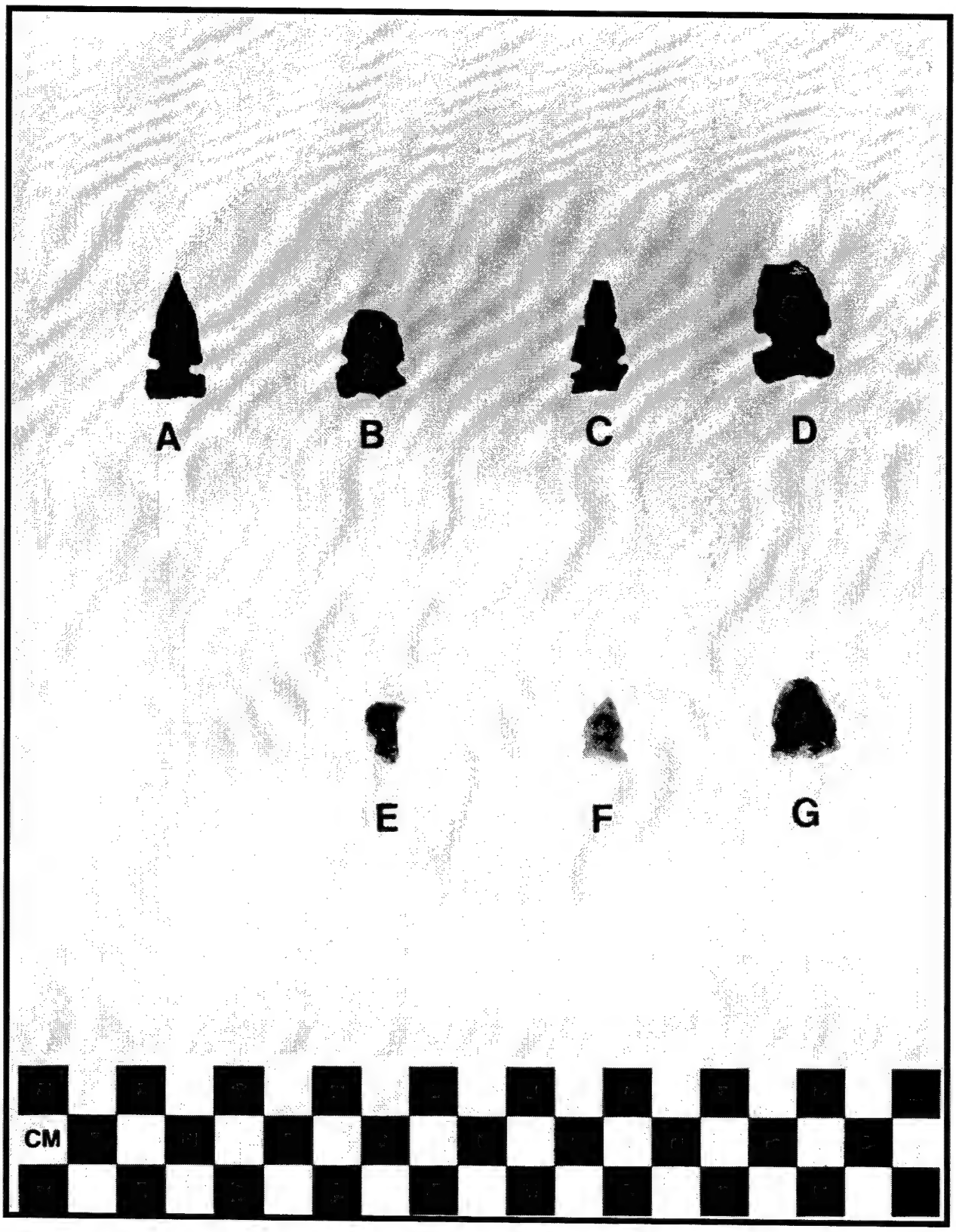


Figure 6.11. Diagnostic Projectile Points: A- 5LA8107.0.1; B- 5LA8149.0.1; C- 5LA8222.0.6; D- 5LA8224.0.3; E- 5LA8266.0.12; F- 5LA8259.0.1; G- 5LA8099.0.1

The high proportion of macro- and microcrystalline materials is likely attributed to the abundance of local materials that can be found in or near Training Area 7. However, these types of materials have a high fracture toughness, and flakes removed from these cores would have been advantageous for their use as expedient tools.

There are 27 core-tools in the artifact assemblage. Core-tools are categorized as formal cores (raw material displaying negative flake scars) coupled with use wear patterns from another functional task. Of these, 26 of the specimens are core/hammerstones, and one is a core with a retouched scraping edge. There is a slightly higher proportion of cryptocrystalline (19%) and macrocrystalline materials (19%) in this group, but overall the crystal structure remains dominated by microcrystalline materials. The core-tools are 78% large and 74% cortical.

Bipolar cores are a class of artifact very seldom recovered from sites in Training Area 7 or the PCMS in general. The likely reason for this is that bipolar core reduction usually occurs at the raw material outcrop; in the PCMS and in Training Area 7, locations containing these types of sites fall outside the Priority I study unit boundaries. In other words, raw materials possibly being reduced by bipolar reduction occur at the source area. By the time these enter Priority I study units, primary core reduction has already occurred.

Chipped-Stone Tool Analysis Summary

The tool assemblage is made up of 14 tool classes. Of these, nearly 75 percent of the assemblage can be attributed to hunting and game-processing activities, and slightly over 25 percent are core-reduction tools. The flaked lithic tools are projectile points (26%), non-bipolar cores and core-tool (25%), bifaces (19%), utilized flakes (12%), scrapers (11%), and unifaces (6%). Those with frequencies of less than 1% are chopping tools, drills, and perforators. The formal tool to expedient tool ratio is 4:1. Because expedient tools can signal a more sedentary population (Parry and Kelly 1987), the data suggest the inhabitants of the Training Area 7 portion of the PCMS could have been a relatively mobile population.

Nonlocal lithic materials are Alibates dolomite (20), Polvadera Peak obsidian (12), Black Forest silicified wood (9), Cerro del Medio obsidian (3), and Obsidian Ridge obsidian (1). The nonlocal material tool kit contains 29% utilized flakes, 22% end/side scrapers, 20% projectile points, 9% each for unifaces, and bifaces, 6% end scrapers, and 2% for both side scrapers, and drills. Local materials (those found in the PCMS) are mostly quartzite (157), hornfels/basalt (148), argillite (135), and chert (125), plus small amounts of silicified wood, orthoquartzite, chalcedony, limestone, schist, and siltstone. Artifacts found in the local material tool kits include cores and core-tools (27%), projectile points (26%), bifaces (20%), utilized flakes (11%), unifaces (5%), end/side scrapers (4%), end scrapers (2%), side scrapers (2%), and drills (1%). The two chopping tools and the perforating tool are also made of locally available material.

Like the debitage, it appears that local materials met the technological and quantitative needs of the community, and raw materials were collected while everyday subsistence activities took place. The biggest tool kit difference involves the presence of cores and core-tools in the local lithic assemblage. This is not suprising, considering that core reduction or raw material

procurement was the dominant lithic reduction strategy recognized in the analysis of the debitage. A noteworthy point is that, in the nonlocal debitage sample, eleven simple flakes and two pieces of shatter were recovered. Seven of these items showed dorsal cortex. This indicates that nonlocal materials were brought to the site as cortical nodules or cores. If this is the case, then why are cores of nonlocal materials absent from the tool assemblages? The answer may lie in the fact all of the nonlocal lithic material is very high quality, and thus cores and cobbles of these materials were completely used and made into small patterned tools. These may have been manufactured into expedient flake tools, based on the high number of utilized flakes. The high number of nonlocal materials also supports a more mobile population in the PCMS.

It is widely recognized that projectile points are ambiguous temporal indicators. Nonetheless, archaeologists continue to use them for assigning ages to sites, and these artifacts are the primary means for assigning age estimates to PCMS sites. Anderson (1989) developed a coding system for the PCMS based on similar point styles from the region and areas outside of southeastern Colorado. From this system, we believe it is possible to assign rough age estimates to sites located in Training Area 7.

Of the 164 projectile points collected during the Training Area 7 survey, 102 could be classified according to the Anderson (1989) system. As shown in Table 6.14 the Training Area 7 portion of the PCMS has seen continuous prehistoric use from the Plano Period of the Paleoindian Stage to the Protohistoric Period of the Late Prehistoric Stage. Changes in projectile point morphology are presumably related to a shift from the use of a spear and atlatl by Paleoindian and Archaic groups to the bow and arrow by Late Prehistoric groups.

In many of Anderson's (1989) classes, the time range crosses more than one prehistoric stage. Though these estimations are broad, two general statements can be made concerning the projectile point assemblage. Only four Paleoindian projectile points were recovered; all date to the Plano Period. Two of these points are from the same intermittent arroyo, just north of Van Bremer Arroyo, and two are from the southern fringe of the Big Arroyo Hills. Likely, the erosion of late Quaternary deposits is the cause of the lack of Paleoindian points. Based on point classes it appears that Training Area 7 was most heavily used during the early portion of the Late Prehistoric Stage.

Ground Stone and Miscellaneous Items

Four hundred and sixteen ground-stone artifacts were recorded from 84 sites in Training Area 7. The ground-stone pieces are often so fragmentary that in many cases it is difficult to determine how many whole artifacts they represent. Four functional artifact groups are present--manos, metates, edge-ground cobbles, and miscellaneous items. Unidentifiable ground-stone fragments were also noted in the field research. The miscellaneous items are artifacts that do not fall within the flaked tool definitions and are more closely related to the ground-stone artifacts -- abraders, celts, polishing stones, or combination tools with two distinct functions. Ground-stone and miscellaneous artifacts are discussed in this chapter. Table 6.15 summarizes the analyzed ground stone. Metric data for ground-stone artifacts are presented in Tables 6.17, 6.18, and 6.21 as well as in the text.

Table 6.14: Age Range and Anderson (1989) Type for Classifiable Points.

Age Range	Anderson Types	Total Count
Plano	P2, P3, P1 (2)	4
Early Archaic	P4 (4), P10	5
Early Archaic to Middle Archaic	P9, P40 (2)	3
Early Archaic to Developmental Period	P47	1
Middle Archaic	P7	1
Middle Archaic to Late Archaic	P13, P14 (2), P18 (3), P45 (2)	8
Middle Archaic to Developmental Period	P12 (3), P19, P28	5
Late Archaic	P20 (2)	2
Late Archaic to Developmental Period	P26 (3), P29, P33	5
Late Archaic to Diversification Period	P35 (7), P27 (3)	10
Developmental to Diversification	P37 (2), P48 (6), P52 (2), P58 (9), P59 (2), P60, P61, P66, P84, P85	26
Developmental to Protohistoric	P42 (3), P49 (8), P50 (2), P69, P70, P79 (6), P80 (5), P83 (6)	32
Total		102

Methods

The ground-stone artifacts were analyzed in the field using the analysis format found in Appendix A. This format was developed during the 1997 field season and is based on the procedures described in Dean (1992). The general data categories examined for each tool include the following: artifact type, material type, overall condition, length, width, burning, surface designation, use area condition, technology, shape, striations, use wear, use location length, use location width, and metate depth. The more complex, edge-ground tools were collected and analyzed using the format found in Appendix B and are thus described in more detail. Measurements for all field artifacts were taken to the nearest centimeter, but weight was not recorded. All artifacts recorded in the field were viewed without the aid of a hand-lens. The collected edge-ground tools were measured using a MIDWAY LCD sliding caliper (1 to 120 mm), and weighed with a PELOUZE electronic scale in 0.1 gram increments. They were examined under a 5X wide-angle table-mounted lens and a 10X hand lens.

Manos

Manos are defined by Bender (1990) as: " groundstone artifacts which exhibit ground surfaces and/or edges. Manos are hand held implements used on large grinding surfaces (metates)". Forty-two percent of the sites found in Training Area 7 contained manos. The mano class consists of 225 one-hand manos, 13 edge-ground cobbles or manos, and one combination hammerstone/mano. Table 6.16 presents the data on mano type by material type. Eight material types were noted. The total mano assemblage is 64% sandstone, 17% quartzite, 13% granite, 2% basalt, 1% conglomerate, 1% schist, 1% diorite, and 1% quartz.

Fifty-six of the 239 manos are complete. In the remaining specimens, 141 are small fragments and 42 are more than 50% complete. Complete mano length ranges from 5 to 18 cm

(average 11.53 cm), width from 4 to 18 cm (average 8.96 cm), and thickness from 2 to 6.5 cm (average 3.98 cm). The summary metric data for all complete manos is illustrated in Table 6.16. The distinction between one- and two-handed manos is subjective. Using the dimensions and width/length ratios of others, Bender (1990) was not able to ascertain a distinct size difference for one and two-handed manos. Based on Bender's (1990) definitions and descriptions and the overall size of the manos, all specimens from this assemblage are considered to be of the one-handed variety.

Table 6.15: Summary of Analyzed Ground Stone

Artifact Group	Total	Percent
Edge-Ground Cobble	14	3.0%
Mano	225	54.0%
Metate	171	41.0%
Miscellaneous Item	4	1.0%
Unknown Fragment	2	1.0%
Total	416	100.00%

Table 6.16: Material Type by Mano Type

	Mano Type			
Material	Mano	Edge-Ground Cobble/Mano	Hammerstone/Mano	Total
Basalt	5	1	0	6
Conglomerate	2	0	0	2
Diorite	2	1	0	3
Granite	30	0	0	30
Quartz	0	0	1	1
Quartzite	37	4	0	41
Sandstone	148	6	0	154
Schist	1	1	0	2
Total	225	13	1	239

Table 6.17: Summary Metric Data for Whole Manos.

	Manos					
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	50	5	18	11.5320	2.7026	7.3043
Width	50	4	18	8.9640	2.6771	7.1668
Thickness	40	2	6.5	3.9825	1.0749	1.1553

Note: All measurements in cm.

All manos are made on natural cobbles or nodules of locally available material and show very little modification prior to or during usage. All show at least one utilized face or edge. Forty-two percent of the specimens show two utilized areas, 3% are utilized on three locations, 2% have four utilized areas, and 1% of the assemblage shows utilization on more than five edges or faces. Wear and modification patterns indicate that 99% of the assemblage display some grinding modification and/or use wear. Of these specimens, 74% display grinding only, 15%

show combination grinding and pecking, 9% are ground and battered, and four specimens (2%) show polish only. In 159 (72%) specimens the striation pattern could not be determined through field analysis. The visible striation patterns are longitudinal (12%), transverse (8%), oblique (4%), circular (3%), and multiple (1%). Three degrees of use wear are present in the assemblage. Sixty-one percent of the assemblage is moderately used, 27% shows light usage, and 12% is heavily used.

Viewed in planview, the manos are 51% oval, 23% irregular in outline, 4% rectangular, 1% round, and 1% square. The remaining 20% of the assemblage are highly fragmented and cannot be classified. Forty-four specimens show some degree of burning in the form of fire-cracks or color changes.

One-Hand Manos

These were recorded from 70 sites in Training Area 7 and represent the largest mano class (n=225). Most of the one-hand manos are made of sandstone (66%), quartzite (16%), and granite (13%). The remaining 5% are conglomerate, basalt, diorite, and schist. The majority (78%) of the artifacts from this class are broken, but (22%) are whole. Of the broken one-hand manos, 61% are small fragments (<50%) and 17% are large fragments (>50%). A large number (n=115, 51%) of oval-shaped manos were identified; the others exhibit irregular (n=52, 23%), rectangular (n=9, 4%), round (n=2, 1%), and square (n=2, 1%) planview shapes. Twenty percent (45) of the assemblage is fragmented, and no planview shape could be determined. The metric data for the one-hand mano group is the same as the all mano group.

Like the all mano class, moderate (61%) use wear dominates the assemblage, with lesser amounts of light (27%) and heavy (12%) usage noted. The four wear patterns are grinding (74%), grinding and pecking (15%), grinding and battering (9%), and polish (2%). On 72% of the specimens, the striation pattern cannot be determined. Examination of the visible striations reveals that 11% were used in a longitudinal grinding motion, 8% show transverse motion, 4% show oblique motion, 4% were used in circular fashion, and 1% show multiple use motions. Forty-four (20%) of the specimens are burned.

Edge-Ground Cobbles/Manos

Edge-ground cobbles can occur in several varieties. The most common form is a smooth, flat, water-worn river cobble, generally oval in shape, which has a ground edge along its long axis and perpendicular to its short axis. The function of edge-ground cobble/manos is problematic. Other researchers have suggested they were used in hide tanning, to process root vegetables, or used in the production of flaked stone tools (Darroch 1974). Ethnographic accounts describe the use of ground-stone tools in processing hides (Lowie 1963; Kewanwytewa and Bertlett 1946; Underhill 1944; Kluckhohn, Hill and Kluckhohn 1971; Belitz 1979; Laubin and Laubin 1957; Ewers 1945, 1958; Wallace and Hoebel 1952; and Pettit 1990), but it is not clear if these stones are identical to the edge-ground cobbles and manos recovered in Training Area 7. Edge-ground cobbles are also reported from the Columbia Plateau, where Butler

(1966:95) suggests they were used in the preparation of vegetal foods. Crabtree and Swanson (1968:50) suggest that edge-ground cobbles may have been used in the production of stone blades.

Thirteen artifacts from 12 sites are classified as edge-ground cobbles or manos. Twelve were collected and further analyzed based on the attributes listed in the coding sheet presented in Appendix B. The material types are 50% sandstone, 25% basalt, 8% schist, 8% quartzite, and 8% granite. A selection preference is seen for fine-grained materials, which amount to 67% of the assemblage. The remaining materials are coarse-grained (25%) and medium-grained (8%). All the lithic materials were collected locally, in cobble (83%), chunk/block (8%), or tabular (8%) form. All of the edge-ground cobbles were recovered in the northern portion of the project from high terrain areas and the Big Arroyo Hills.

Nine of the twelve specimens collected were whole. For the most part, these edge-ground artifacts are much larger than other hand-held tools in the overall mano class. They are close in overall size to what could be considered a two-handed mano. In these specimens, the length ranges from 131 to 194 mm, the width from 60 to 125 mm, the thickness from 29 to 47 mm, and the weight from 588.2 to 1,155.1 grams. The metric data for all edge-ground cobbles is illustrated in Table 6.18.

Table 6.18: Summary Metric Data for Whole Edge-Ground Cobbles.

Edge-Ground Cobbles						
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	9	131	194	159.2222	21.0878	444.6944
Width	9	60	125	86.2222	19.3247	373.4444
Thickness	9	29	47	38.4444	7.0376	49.5278
Weight	9	588.2	1155.1	846.8333	169.490511	28727.183
Use Angle	12	60	90	73.55555	8.632947224	74.527778
Striation Degree	12	0	90	26	49.29503018	49.29503

Table 6.19: List of Sites With Temporally Diagnostic Artifacts/Structures and Edge-Ground Cobble/Manos.

Site	Diagnostic Materials/Structures	Start Date Years	End Date Years
5LA8217	Projectile Points	2000 BC	AD 1400
5LA8224	Projectile Point	AD 750	AD 1650
5LA8266	Projectile Points, Ceramics	AD 750	AD 1750
5LA8274	Projectile Point	AD 800	AD 1750

In ten of the twelve examples, the parent piece was apparently modified to some degree before use occurred. Nearly 67% show heavy modification, with lesser numbers of moderate (25%) to light (8%) modification. One-third (33%) of the specimens are biconvex in cross-section, with rhomboid (17%), irregular (17%), oval (8%), rectangular (8%), round (8%), and

triangular (8%) cross-sections also recorded. The planviews are subrectangular (4), triangular (2), oval (2), irregular (2), cresentic (1), and sub-triangular (1).

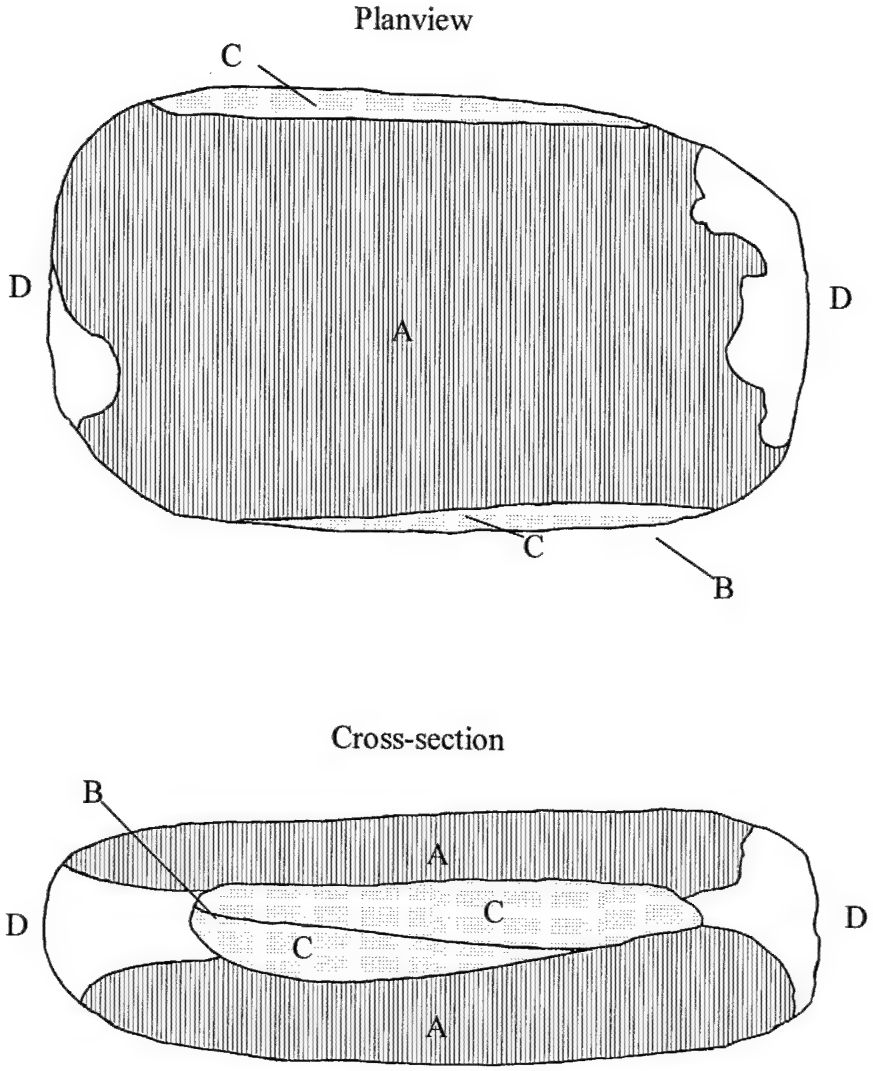
Six of the twelve specimens exhibit only one utilized facet. Of the remainder, three exhibit two facets, two show four facets, and one shows six distinctly beveled facets. These tools were held at 60 to 90 degrees to the surface of wear. On eight specimens, the facet is single-beveled; two have double-beveled facets; one has a three-beveled and another a four-beveled facet. When viewed from end to end, these beveled edges are 42% straight, 33% convex, and 25% concave. Eight exhibit ground/polished use wear, two show abrasion wear, one shows polish use wear, and one is ground only. Half of the specimens show transverse striations, with longitudinal striations (3), and multiple striations (2) in lesser numbers. In one specimen it is not possible to determine striation direction. The visible striation angles vary from perpendicular (90°) to parallel (0°) in relation to the long axis of the artifact. Five show no associated battering. Five have battering on the ends only, and two show battering on the ends and facets. Five display facial striations from secondary mano usage, and three exhibit a red color change from heat exposure.

In every case, edge-ground mano/cobbles were found in association with other ground-stone artifacts. Four of the edge-ground tools were recovered from sites containing temporally diagnostic artifacts (Table 6.19). In the Black Hills area of the PCMS, edge-ground cobbles are reported on sites with very similar dates (Owens et al. 2000: Table 6.6). For the most part, dates from the Black Hills and the Training Area 7 portion of the PCMS are similar, and most of the edge-ground cobbles appear to have been used during the Late Prehistoric Stage. This information is based only on surface-recovered artifacts that are cross-dated with temporally diagnostic artifacts and structures.

Each edge-ground artifact that was collected is described separately below. Each is listed by site and catalogue number, and each is described in terms of material type, attributes (Figure 6.12), dimensions, and weight.

5LA8214.0.1

The tool is a broken edge-ground cobble made of medium-grained schist. It displays two used edges, each with a single facet. Both show two bevels per facet that are the product of abrasion and not modification. The striations are longitudinal and the use angle is 81 degrees. The facets are convex in planview. It is made on an unshaped block that is subrectangular in planview and irregular in cross-section. Battering is seen on both ends and on one facet. No secondary mano use (facial grinding) is present. It measures as follows: length 142 mm, width 76 mm, thickness 37 mm, lateral edge length1 119 mm, lateral edge length2 74 mm, lateral edge width1 23 mm, lateral edge width2 18 mm. The weight is 674.7 grams.



A – Face
B – Edge
C – Facets/Bevels
D – Ends

Figure 6.12: Edge-Ground Cobble Attributes.

5LA8215.0.1

This complete cobble specimen is made of fine-grained basalt. It is subrectangular in planview and irregular in cross-section. It exhibits triple bevels on two utilized edges and these are straight when viewed from end to end. Heavy polish wear is seen along the six beveled facets, and these working edges were held at angles varying from 55 to 90 degrees from the object being worked. The longest bevel measures 158 mm by 6 mm, and the smallest measures 142 mm by 7 mm. The remaining four bevels average 151 mm in length and 7.7 mm in width. This artifact exhibits no secondary mano use and no evidence of heat treatment or adhesions. This specimen measures 171 mm in length, 60 mm in width, 29 mm in thickness, and weighs 648.9 grams.

5LA8217.0.9

This complete tool is made on a modified coarse-grained quartzite cobble. It is oval in planview and biconvex in cross-section. It exhibits one single beveled facet on one utilized edge that is convex in planview and measures 96 mm in length and 22 mm in width. Moderate abrasion use wear is seen along the edge, and battering is present on both ends. The artifact was also used as a formal one-hand mano, with use wear seen on top of abrasion. The specimen measures 134 mm in length, 90 mm in width, 47 mm in thickness, and weighs 863.9 grams.

5LA8217.0.22

The edge-ground tool fragment is made of coarse-grained basalt; it displays one straight facet on one lateral edge. The tool has a single bevel on the facet from modification and use wear. Use wear (in the form of polish and transverse striations) is at a 70° degree angle relative to the nether surface. It is made on a cobble that is irregular in planview and biconvex in cross-section. Secondary mano usage is present, but no battering is evident. The artifact appears to have been fire-cracked as it shows a red color change from heat exposure. The following measurements were taken: length 83 mm, width 72 mm, thickness 50 mm, lateral edge length 46 mm, lateral edge width 22 mm. The weight is 357.2 grams.

5LA8223.0.2

The tool is an edge-ground cobble fragment made on a modified chunk of coarse-grained granite. It is triangular in planview and cross-section and exhibits a single beveled facet on one edge. This edge is convex in planview and measures 116 mm in length and 23 mm in width. The use angle is 72 degrees. Heavy polish use wear is seen, with no visible striations. No secondary hammerstone or mano usage was noted. The specimen measures 142 mm in length, 78 mm in width, 46 mm in thickness, and weighs 620.4 grams. It is reddened and spalled from heat exposure.

5LA8224.0.7

This complete specimen is made on a waterworn, fine-grained sandstone cobble. The overall shape is triangular in planview and biconvex in cross-section. Modification in the form of grinding is evident along one working edge, with a single concave facet at 74 degrees. Use wear

is present in the form of polish and multiple-angle (45-90 degree) striations on the facet. Secondary mano use is present on one face, and battering is seen on both ends. This specimen measures 160 mm in length, 87 mm in width, 43 mm in thickness, and weighs 834.7 grams. The facet measures 93 mm in length and 21 mm in width.

5LA8238.0.1

This complete tool is made of fine-grained sandstone and displays two facets on the edges and two on the end. All display four bevels per facet that are the product of grinding and polishing use wear. The striations are transverse, and the use angle is 60 degrees. The facets are convex in planview. It is made on a waterworn cobble that is oval in planview and round in cross-section. No secondary mano or hammerstone use is evident. The tool measures as follows: length 147 mm, width 60 mm, and thickness 43 mm. The facet lengths vary from 71 mm to 109 mm, and the widths from 7 mm to 41 mm. The weight is 588.2 grams.

5LA8238.0.2

This complete specimen is made on a modified fine-grained quartzite cobble. It is irregular in planview and biconvex in cross-section. It exhibits a single beveled facet along one edge that is straight in planview and measures 118 mm in length and 15 mm in width. Heavy grinding and polishing use wear is found along the working edge. This edge is angled at 78 degrees to its nether surface. The tool was also used as a formal one-hand mano and a hammering tool. It has grinding use on one face and battering on both ends. This specimen measures 150 mm in length, 83 mm in width, 46 mm in thickness, and weighs 885.3 grams

5LA8262.0.1

This complete specimen is fine-grained basalt. It displays two facets on one edge. Both facets exhibit two bevels. Grinding wear and modification are obvious on the 69 degree angle working edge. The striations are transverse. The facets are straight in planview. The artifact is made on a waterworn cobble that is subrectangular in planview and rhomboid in cross-section. No mano or hammerstone use is evident. The following measurements were made. Length 131 mm, width 94 mm, thickness 34 mm, lateral edge length1 75 mm, lateral edge length2 75 mm, lateral edge width1 6 mm, lateral edge width2 9 mm. The weight is 774.1 grams.

5LA8266.0.1

This complete specimen is made of fine-grained sandstone and displays a single facet along one edge. The facet measures 132 mm in length and 25 mm in width and is the product of polishing use wear and grinding or abrading modification. The striations are oblique (70-90 degrees) and the working edge angle is 90 degrees. The facet is concave when viewed from the end and suggests this artifact was either very heavily used or was used as an "active" tool over a convex "stationary" surface. This modified cobble is rectangular in planview and subrectangular in cross-section. One surface was used like a normal mano; this utilized surface measures 140 mm by 79 mm. The overall dimensions are 164 mm in length, 86 mm in width, and 41 mm in thickness. The weight is 989.2 grams.

5LA8274.0.12

This complete edge-ground tool is made on a modified cobble of fine-grained sandstone. It exhibits single beveled facets along both edges. Both are straight in planview. The first edge measures 160 mm by 24 mm, and the second measures 55 mm by 6 mm. Heavy abrasion is obvious in association with transverse striations along the 90° angle working edge. The other side shows a 45° working edge and oblique striations. This artifact shows secondary use as a one-hand mano (90 by 18 mm) and ring fractures are visible on the ends and faces. The specimen measures 182 mm in length, 125 mm in width, 34 mm in thickness, and weighs 1,155.1 grams.

5LA8282.0.1

The complete edge-ground tool is manufactured from an unmodified cobble of fine-grained sandstone. It is oval in planview and crescentic in cross-section. It exhibits a single beveled facet along one concave edge. This edge shows heavy polish use wear and transverse striations across the working edge (used at a 90° angle from the object being worked). No secondary mano usage is present, but both ends show distinct battering. The measurements for this complete artifact are 194 mm in length, 91 mm in width, and 29 mm in thickness. The weight is 882.1 grams. The bevel measurement is 140 mm by 24 mm.

5LA8328.0.1

This complete specimen is made of fine-grained quartzite. It displays single facets on both lateral edges. Grinding and polishing wear is visible on the 90 degree angle working edge. Heavy polish makes the striation angle difficult to determine. Both facets are straight in planview. The artifact is made on a waterworn cobble that is subrectangular in planview and oval in cross-section. No secondary mano or hammerstone use is evident. The following measurements were taken: length 150 mm, width 60 mm, thickness 32 mm, lateral edge length (left side) 110 mm, lateral edge length (right side) 97 mm, lateral edge width (left side) 10 mm, lateral edge width (right side) 12 mm. The weight is 813 grams.

5LA8626.0.1

This complete cobble specimen is made of medium-grained sandstone. It is irregular in planview and biconvex in cross-section. It exhibits a single bevel on one lateral edge; this is convex when viewed from end to end. Heavy grinding wear and longitudinal striations are visible on the facet, and this working edge was held 90 degrees from the object being worked. The bevel measures 125 mm by 22 mm. This specimen measures 165 mm in length, 81 mm in width, 30 mm in thickness, and weighs 857.4 grams.

Edge-Ground Cobble Summary

The diverse possible functions offered by archaeologists for edge-ground cobbles indicate that they do not know how they were used. Discovering the function of edge-ground cobbles has

been a goal in the field research at the PCMS (Loendorf and Loendorf 1998; Owens et al. 2000), and the data collected in Training Area 7 research offers some clues as to their function. Two lines of evidence are discussed below; the first few paragraphs support a plant processing function, the last paragraphs point to the possibility for hide working/processing.

The locations where edge-ground cobbles are found suggest they were not used as hide-processing tools. They are nearly always found on the same sites as manos and metates or tools that were clearly used for grinding purposes. These sites represent obvious areas where seed collection and processing was of primary importance. They are not sites where the tool assemblages reflect a heavy reliance on hunting, butchering, or processing meat and hides. This suggests edge-ground cobbles are found on sites where subsistence was dominated by plant collection and not hunting. This same argument can be made with regard to the use of edge-ground cobbles to produce blades or other chipped-stone tools. The cobbles are consistently found with other ground-stone tools and not on quarry sites or places where chipped stone tools were manufactured.

Mano caches with the tools still in them were found on 5LA3242, 5LA7333, and 5LA6595. Other mano caches are obvious where the artifacts are found clustered together as they are exposed on the surface through erosion. Edge-ground cobbles have been recovered from the same cache areas as manos. Archaeologists know that the inhabitants of the PCMS were curating their manos by storing them in cache pits in between uses. Sites that exhibit dozens of bedrock metates have not contained any manos. For example, site 5LA6575, a rockshelter in Welsh Canyon, has well over one hundred bedrock metates on sandstone surfaces inside the shelter. Even though this is a significant number of grinding surfaces, no manos or other hand-held grinding implements were found. This suggests the individuals who used the surfaces for grinding took their manos with them to use on another day or at another location.

Archaeologists excavated five manos, including two edge-ground cobble tools and three of the more common one-hand variety, from a cache at 5LA3242. The tools were recovered at the bottom of a pit measuring 1.5 to 2 m in diameter and at least 30 cm in depth (Loendorf et al. 1996:207-209). The manos were apparently placed in the pit and covered with heat-cracked stones to hide them for future use. The edge-ground cobble tools were subjected to pollen washes to try to learn if they had any particular pollen associated with them. No pollen was found on them, but abundant pollen from the contents of the pit was dominated by cheno-ams (Loendorf et al. 1996:209). The evidence suggests the pit was used for cheno-am storage. The manos and the edge-ground cobbles were hidden under a pile of heat-cracked stones at the bottom of the seeds. This storage feature and cache had an uncorrected radiocarbon age of 2980 ± 60 BP, an age estimate that is at the beginning of the Late Archaic Period.

Many edge-ground cobbles display some secondary use evidence. The same tool that has the beveled edge use will also have flat faces with smoothing from normal mano use. This secondary use wear suggests the tools were in use at the same time as manos where the user would employ the beveled edge for a task and then use it for seed grinding as a regular mano.

The lithic materials used to make edge-ground cobbles are usually dense (67% in the edge-ground cobble assemblage) with a fine, compact grain structure. About a fourth of the edge-

ground cobbles found in the PCMS are made of basalt that is dense and hard with olivine crystal inclusions. Another fourth are made of schists, quartzite, and granite, materials that are usually more dense and coarse-grained than sandstone. This dominance of fine-grained material types in the assemblage is unusual if the tools were used for processing hides because the best hide-processing stones are made of medium- or coarse-grained materials. Adams (1988: 314) writes, "A finer grained material can be used but may not be rough enough to raise a nap or work the braining solution into the hide." In other words, if edge-ground cobbles functioned for processing hides, the material types used to make them should be more porous and coarse-grained. Maybe a fine-grained stone was desired for thinner pelts, as an abrasive or rough stone would have damaged the hide.

A necessary step in understanding why fine-grained materials could have been used for hide processing is to investigate the contact performance of soft surfaces subjected to frictional grinding or wear. Whenever surfaces move over each other (hard or soft), wear will occur. At the area of contact, damage to one or both surfaces is seen, and there is generally a loss of material. Adams (1988:310) outlines and describes four wear processes resulting from contact pressure. The four basic types of wear are abrasive, adhesive, fatigue, and tribochemical (corrosive). The boundary between wear types is not rigid, and in many cases, more than one wear process can occur simultaneously. It appears that in fine-grained materials adhesive wear would allow for the working of hides. With or without a liquid medium, strong adhesive forces would be generated at the interface between the hide and edge-ground cobble. The much softer (elastic) hide would push up into the pore spaces between individual grains and in effect, provide a larger area of real contact or multi-surface contact.

If the edge-ground cobbles found in the PCMS region were used to process hides, how would this be visually determined? Adams (1988:313) concluded from experiment that hide-processing stones display a highly lustrous sheen along the utilized (working) edge and this is caused by both adhesive and tribochemical wear processes. The glossy sheen/polish she describes for hide-processing stones is visible at the facets or working edge of every edge-ground tool in the assemblage. In nearly every case, manos or food-processing stones lack this sheen.

Another perplexing feature is that edge-ground cobble tools are consistently larger than one-hand manos. Complete ones range from 131 to 194 mm in length, with an average of 159 mm. One-hand manos have a mean length of 115 mm. These sizes suggest that two-hands were employed when using the tools. Perhaps this was because the effort required the user to press hard with the strength of both hands.

At the writing of this report, the function of edge-ground cobbles remains unclear. As demonstrated, evidence supporting both food processing and hide processing exists. Because many edge-ground cobbles show a secondary facial grinding or typical mano usage, maybe there is no primary function for this tool. In other words, maybe this tool was used for both food processing and hide work. The answer to this perplexing problem may be explained through additional experimentation, and artifact comparison. Researchers at NMSU are currently experimenting with hide processing and are trying to replicate use wear patterns visible on the facets of edge-ground cobbles. Once a clearer picture for wear patterns is determined, the primary function for edge-ground cobbles should follow.

Hammerstone/Mano

5LA8226.3.1

The specimen differs from edge-ground tools in that both the hammerstone usage and the grinding activity are primary functions that occurred simultaneously. The tool is made from a quartz crystal. It exhibits light polish use wear and battering on one face and one lateral edge. This specimen measures 7 cm in length, 6 cm in width, and 5 cm in thickness. No weight was recorded in the field.

Metates

Metates are artifacts characterized by at least one large grinding surface upon which vegetal foodstuffs or pigments were crushed or ground with a mano. All of the metates recorded in Training Area 7 possess attributes that fit them within the Bender (1990) classifications. They fall within three basic types -- slab metates (141), basin metates (28), and bedrock metates (2). The metates, described in Table 6.20, are primarily sandstone (94%), basalt (3%), quartzite (2%), and tuff (1%). Only four percent of the assemblage is comprised of whole artifacts. In those remaining, 84% are smaller than half and 12% are larger than half. The metates were recorded from 55 project sites.

Complete metates range from 12 to 240 cm (average 87.5 cm) in length, 12 to 360 cm (average 85.86) in width, and 3 to 15 cm (average 6.6 cm) in thickness (Table 6.21).

Table 6.20: Material Type by Metate Type

	Metate Type			
Material	Basin	Bedrock	Slab	Total
Basalt	1		4	5
Quartzite	0	0	4	4
Sandstone	26	2	133	161
Tuff	1	0	0	1
Total	28	2	141	171

Table 6.21: Summary Measurement Data for Whole Metates.

	Metates					
Variable	Valid Number	Minimum	Maximum	Average	Standand Deviation	Variance
Length	7	12	240	87.5000	104.5996	10941.0833
Width	7	12	360	85.8571	128.6642	16554.4762
Thickness	7	3	15	6.6000	4.8270	23.3000

Note: All measurements in cm.

Slab Metates

Slab metates were recorded on 48 separate sites; they represent the largest metate class. The majority are sandstone (94%), with fewer quartzite (3%) and basalt (3%) specimens. Ninety-nine percent of the assemblage is broken. Twenty percent of the assemblage shows some degree of heat exposure. With only two complete specimens, metric data was not recorded for the group. Due to the fragmented nature of the assemblage, the planview could be determined in only 75 (53%) specimens. Of these, 64 metates were irregular in outline, six are rectangular, three are oval, and two are square in shape.

Moderate use wear dominates the assemblage and was noted on 43% of the specimens. Lesser amounts of light (38%) and heavy (13%) use wear were also noted. In highly fragmented specimens (6%) the use-wear patterns could not be determined. The five use-wear patterns are grinding (62%), grinding and pecking (26%), grinding and battering (10%), pecking (1%), grinding and flaking (1%). On 72% of the specimens the striation pattern could not be determined. In those with visible striation patterns, orientation is longitudinal (10%), transverse (6%), circular (6%), oblique (3%), or multiple (3%).

Basin Metates

Twenty-eight metates from 25 sites are classified as basin metates. The material types are sandstone (92%), basalt (4%), and tuff (4%). Only three specimens are whole. In the 25 remaining specimens, 19 are classified as <50% complete and six are >50% complete. Four specimens show a red color change from heat exposure. In the three complete specimens, length ranges from 12 to 35 cm (average 21.33 cm), the width from 12 to 27 cm (average 18.33 cm), and the thickness from 3 to 6 cm (average 4.33 cm). Weight data are not available, as these artifacts were recorded in the field.

In seven specimens (29%) the planview cannot be determined. In those that could be further classified, 14 (50%) are irregular, three (11%) are rectangular, two (7%) are oval, and one (3%) is square in outline. Use-wear patterns grade from light (14%), to moderate (61%), to heavy (25%). The technology, or use wear/modification classifications are 50% ground and pecked, 42% ground, 4% ground and battered, and 4% polished. Striations were most often multiple (11%) or oblique (11%) in orientation, with longitudinal (7%), circular (4%), and transverse (4%) striations also noted. For the majority of the assemblage (63%) striation patterns could not be determined.

Bedrock Metates

Each bedrock metate is described separately below and listed by site, and field specimen number. They are described in terms of material type, attributes, and dimension.

5LA8022 FS4

The grinding surface is a single milling surface on a large outcropping of sandstone. The outcrop measures 2.4 x 3 x 6 m. The grinding area (118 x 12 cm) has been modified by surface pecking and exhibits light use wear. The striation pattern was not evident.

5LA8033 FS1

The metate surface is exposed on a small sandstone outcrop that was designated Feature 1. The outcrop measures 240 x 138 cm in width. The milling slick displays moderate grinding and multiple-striation use-wear patterns. The grinding use area measures 29 x 23 cm.

Miscellaneous Items

Three miscellaneous items were recorded during the research in Training Area 7. They include one shaft straightener, one celt/edge-ground cobble, and one polishing stone. Each tool is listed by site, and field specimen number when applicable. Specimen numbers are listed for collected artifacts. They are described in terms of tool type, lithic material type, attributes, dimensions, and weight.

5LA8062 FS4 Polishing Stone

This polishing stone fragment is an unmodified basalt nodule displaying light, longitudinal striations on one face. The utilized area measures 4 cm in length and 1 cm in width. Overall, this specimen measures 3.5 cm in length, 2.5 cm in width, and 1.5 cm in thickness. This artifact was analyzed in the field and not weighed. No color change from heat exposure is evident.

5LA8215.0.1 Celt/Edge-Ground Cobble

This complete artifact is made on an unmodified basalt cobble. It is rectangular in both planview and edgeview. It exhibits three areas of modification and use wear along both edges and one end. The lateral edges show three distinct facets per side. These facets measure 14 cm in length and exhibit multidirectional striations owing to light and moderate usage. Heavy battering is present on both ends, and one was ground to the desired shape and then used as a battering tool. This specimen measures 171 mm in length, 60 mm in width, 29 mm in thickness, and weighs 648.9 grams.

5LA8231.0.31 Shaft Straightener

This complete shaft straightener is made on an unmodified fine-grained quartzite cobble. It exhibits an abraded groove running crosswise through the center of one face and minimal battering around the periphery. The opposite edge evidences mano use, with heavy use wear in the form of longitudinal striations. The overall shape is oval in both planview and edgeview. A bright red color change suggests heat exposure. This specimen is 124 x 78 x 60 mm in size and weighs 826.4 g. The abraded groove is 70 mm in length, 19 mm in width, and 10 mm in depth.

Chapter VII: CONCLUSIONS

During the survey, field crews from New Mexico State University discovered and evaluated one hundred and sixty-seven prehistoric sites in Training Area 7. Because there are so few historic sites (eight prehistoric with a historic component, three historic only) it is not possible to make meaningful comparative statements. For this reason, sites with only historic materials or a predominance of historic debris are not discussed in these conclusions. Previously recorded sites that were revisited and re-evaluated are also excluded from this discussion.

Of the sites evaluated in the Training Area 7 survey, one hundred and fifty-seven were classed as lithic scatters, six were cultural material scatters with structure remains, three were lithic scatters with thermal features, and one contained a series of petroglyph panels. When compared to Welsh Canyon (Loendorf and Loendorf 1999:53) or the Black Hills (Owens et al 2000:306), both similarities and differences are evident. Lithic scatters represent 98% of the sites in the Training Area 7 survey, and the sites discovered in the Black Hills survey that was mostly on the ridge tops and sides, out of the canyons, are 88% lithic scatters. On the other hand, sites found in the Welsh Canyon survey are only 56% lithic scatters. In part, this reflects the potential for finding rockshelter sites in the canyons, a natural feature that is not as common on the ridges or in the steppe terrain. This difference is reflected in the absence of rockshelters located in the Training Area 7 investigation.

Procurement sites also appear to be nonexistent in Training Area 7. This can be simply explained. The Priority I portions of Training Area 7, the portions in which the survey was concentrated, are in relatively open terrain. Settings containing bedrock and outcrops are rare, and exposures that contain potential materials for making stone tools were not available to the prehistoric inhabitants of the PCMS.

The analysis of the lithic artifacts from the field investigations provides information regarding lithic material acquisition and manufacture, mobility, and chronological trends through projectile point morphology. In Training Area 7, hornfels/basalt, argillite, quartzite, and chert are the dominant lithic materials in the debitage assemblage. Argillite and hornfels/basalt outcrop at the hogback, fine- and coarse-grained quartzite outcrops in the numerous permanent and intermittent arroyos throughout the area. Cobbles and nodules of chert are encountered in Quaternary lag gravels near upper Van Bremer Arroyo and in intermittent streambeds. Gravel deposits along the Purgatoire River also offer good potential for obtaining cherts. So even though the survey in Training Area 7 did not include these areas, the raw materials for making chipped-stone tools were locally available. We suspect that most of the materials were obtained by an embedded tactic (Binford 1977, 1979; Binford and Stone 1985), that is, the incidental collection of raw materials while pursuing everyday subsistence activities.

Nonlocal materials encountered in the debitage and chipped-stone tools included Jemez Mountain Obsidian (Polvadera Peak, Obsidian Ridge, and Cerro del Medio sources), Alibates dolomite, and Black Forest silicified wood. These were found as biface-thinning

flakes, complex flakes, simple flakes, and shatter in the debitage. The tools were utilized and/or retouched flakes, scraping tools, projectile points, bifaces, and drills.

The presence of cortex on seven items indicates unmodified cobbles or nodules of Black Forest silicified wood, Cerro del Medio obsidian, Alibates dolomite, and Polvadera Peak obsidian entered the southwestern portion of the PCMS. Based on flake type, nonlocal materials also entered the area as large, unpatterned bifaces or prepared cores. Debitage data shows that once here, nonlocal materials were reduced to produce patterned tools, flake tools, and flakes. It is unknown whether the procurement tactic for nonlocal materials involved seasonal movement or trade and exchange; either way, the transport routes appear to be aligned north-south and along the eastern slope of the Rocky Mountains. Canyons limit north to south travel in the eastern portions of the PCMS. In future investigations we plan to examine the incidence of cortical nonlocal flaking debris in the eastern versus the western portions of the PCMS.

Compared to patterned tools, simple flakes and complex flakes dominate the artifact assemblage. Although both expedient flake technology and bifacial technology appear to have been used by the prehistoric inhabitants of the PCMS, high percentages for simple flakes and the presence of considerable amounts of shatter indicate that formal core reduction or raw material procurement is the dominant lithic reduction strategy for locally available materials. Debitage recovered from sites throughout the study unit indicates there is also a strong emphasis on flake production and tool manufacturing/resharpening.

Ten general tool classes are found in the chipped-stone tool assemblage: projectile points, non-bipolar cores and core-tools, bifaces, utilized flakes, scrapers, chopping tools, drills, perforators, and unifaces. Seventy-five percent of this assemblage can be attributed to hunting or game processing, with core-reduction tools making up the remainder. The formal tool to expedient tool ratio is 4:1 and suggests the possibility of a mobile prehistoric population.

Four hundred and sixteen ground-stone artifacts were recorded from Training Area 7. These are manos (225 one-hand manos, and a combination hammerstone/mano), metates (141 slab metates, 28 basin metates, and two bedrock metates), edge-ground cobbles (13), and miscellaneous items including an abrader, a celt, and a polishing stone.

Figures 7.2, 7.3, 7.4, 7.5, and 7.6 provide information on lithic artifact date range, material type, tool variation, and artifact type. Using Anderson's (1989) temporal dates for projectile points in the PCMS, we have made some generalizations regarding the prehistoric tool kit and artifact assemblages. The most obvious is that most projectile points recovered in Training Area 7 are Late Prehistoric in age, and thus most sites date to, or have at least one component dating to, this period. Also, during the Late Prehistoric Period, nonlocal Black Forest silicified wood was highly desired by inhabitants of the PCMS.

Comparing debitage type and material by temporal age range we learn that hornfels/basalt and argillite were highly sought after by peoples from the Paleoindian period to the Late Prehistoric Period. Debitage material types have essentially stayed the same through time. The one possible difference is the absence of biface-thinning flakes in certain time periods, but part of the problem may be our inability to find small pressure flakes in the field analysis due to heavy site erosion in this portion of the PCMS.

In the analysis of the non-collected and collected artifacts, the four major topographic units (Schuldenrein et al. 1985) were used to arbitrarily divide Training Area 7. These topographic settings/units include the steppes, hogback, canyons, and hills. See Figure 2.1 for the location of these features, and a brief description for each can be found at the beginning of Chapter II. Table 7.1 lists the site age by topographic setting.

Subdividing the Training Area 7 portion of the PCMS allows us to make some generalizations regarding procurement strategy, and subsistence. Only three combined sites are shown for the canyon areas and the hogback; this count is too low to obtain meaningful results, and these are not considered further in this analysis. Because the grassland steppes are the largest of the topographic settings, it is not surprising that they contain the greatest number of sites, and the greatest number of lithic tools. However, comparing sites in the steppe portion of the base to sites in the Big Arroyo Hills produces some meaningful results. As stated above, the steppes contain more debitage items overall, but, hill sites contain more flakes per site. The ratio of chipped-stone tools to debitage is higher in the steppes, though the actual number of chipped-stone tools per site is higher in the hills. The most glaring difference between the two areas is that sites found in the hills contain a 1:1 ratio for chipped-stone tools and ground-stone tools. Also, the actual number of ground-stone tools per site in the hills is much higher than on the steppes.

Subsistence strategies in the Big Arroyo Hills suggest hunting and gathering mixed with a definite emphasis on food processing. The ratio of projectile points to ground-stone tools (0.42) supports this assumption. Projectile points recovered from the surface in the Big Arroyo Hills indicate continuous occupation from the Archaic Period to the Protohistoric Period. Eight sites with diagnostic artifacts indicate multiple periods of use. Based on information contained in Table 7.1 we can argue that the reason there are more ground-stone tools in the Big Arroyo Hills is that access to floral resources is good. The southern rim/mesa edge of the Big Arroyo Hills contains a high number of piñon trees, and grass species like threeawn and Indian ricegrass are abundant in the area. In addition, plants here, especially trees, would have provided fuel and cover for human inhabitants. The plant community would have also provided food, cover, and shelter for larger herbivores like deer, and antelope. The high number of chipped-stone tools per site seen in the hill portion of Training Area 7 suggests these animals and others were hunted here. Visibility is another important attribute of the site locations in the hills. Vantage and the opportunity to see ungulates on the steppes and the relatively quick access to the game would have been possible from the Big Arroyo Hills.

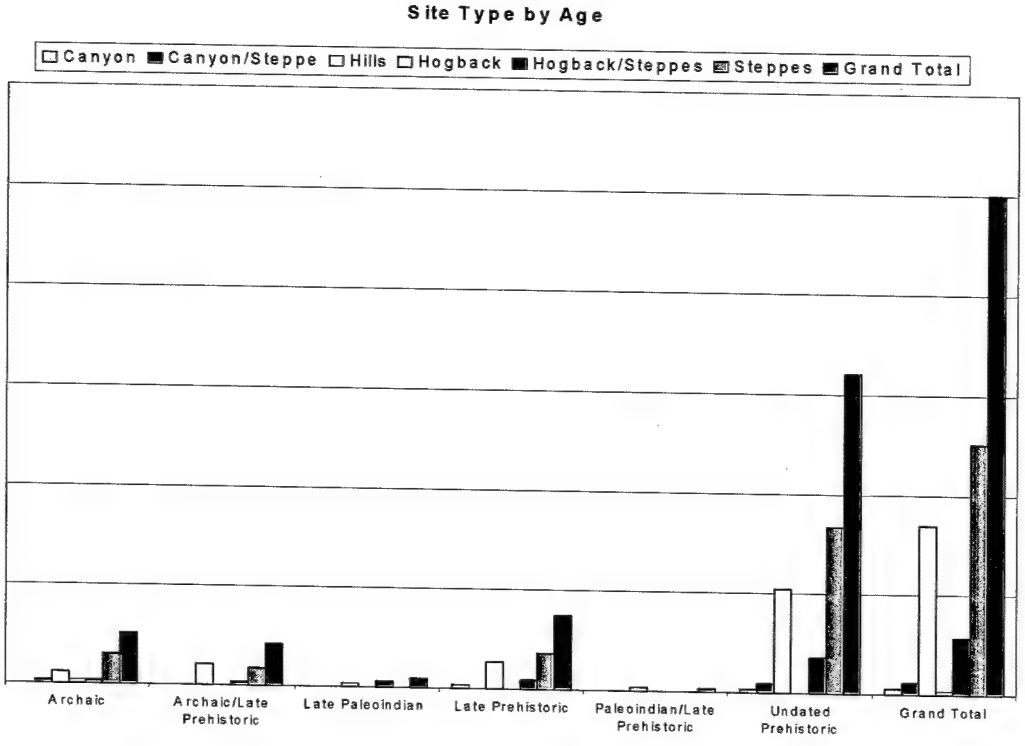


Figure 7.1: Site age by topographic setting for Training Area 7 sites.

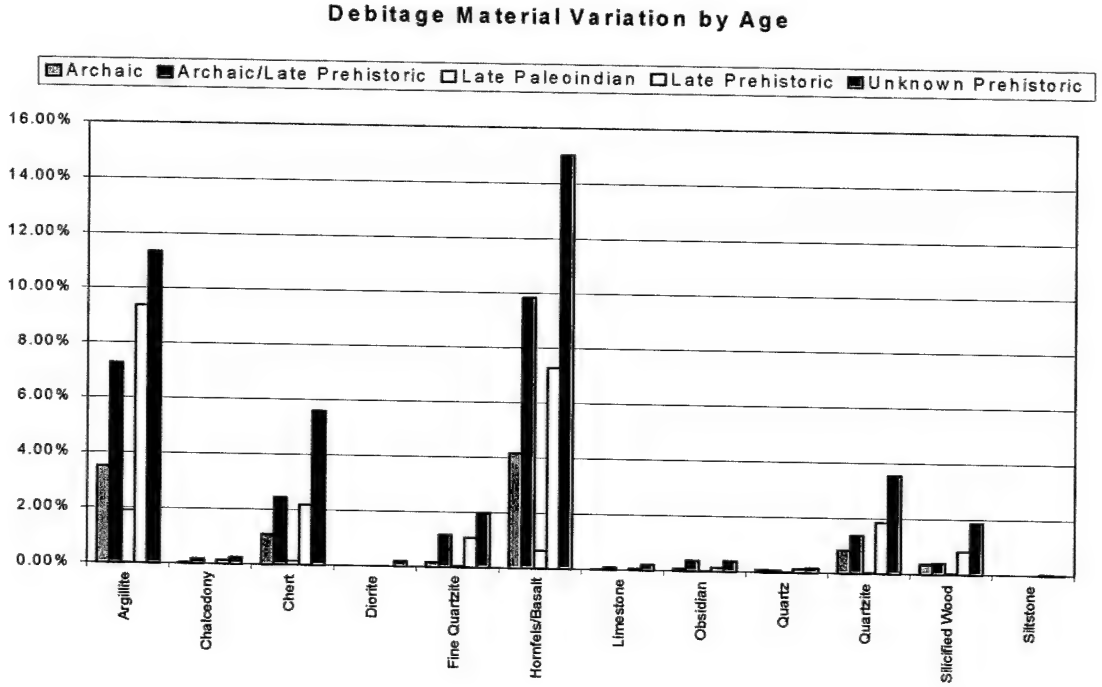


Figure 7.2: Debitage material variation by age for Training Area 7 sites.

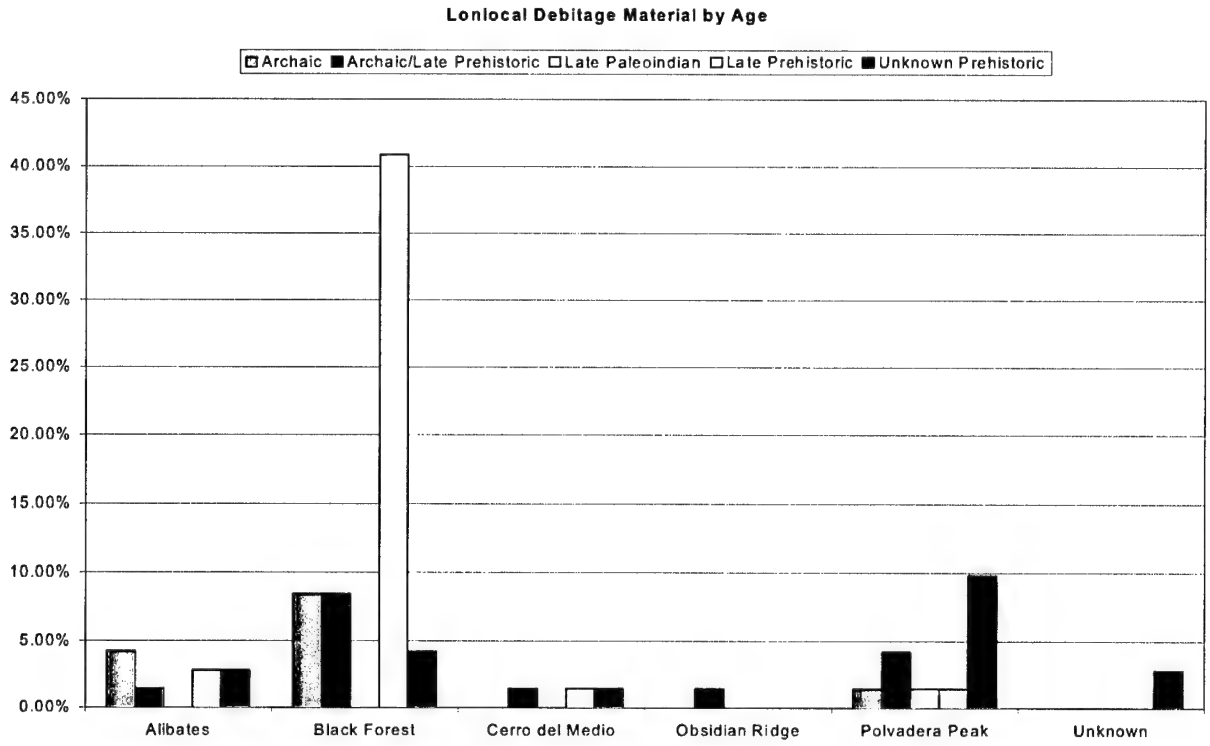


Figure 7.3: Nonlocal debitage material by age for Training Area 7 Sites.

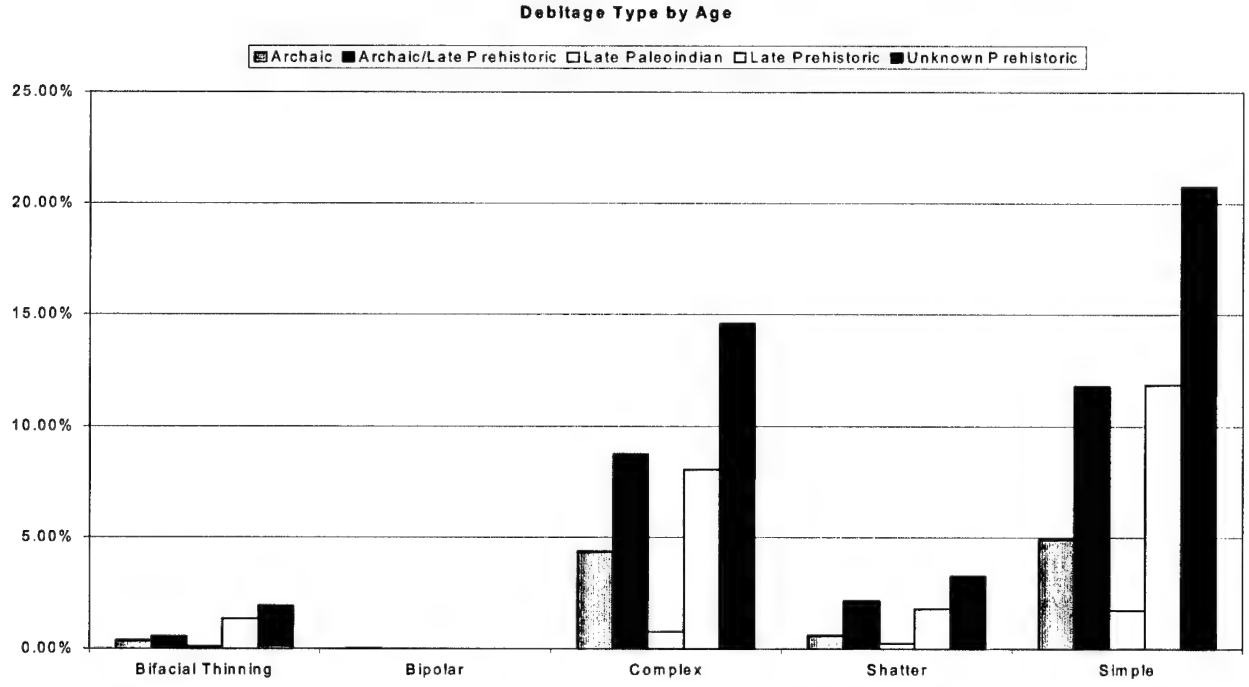


Figure 7.4: Debitage type by age for Training Area 7 Sites.

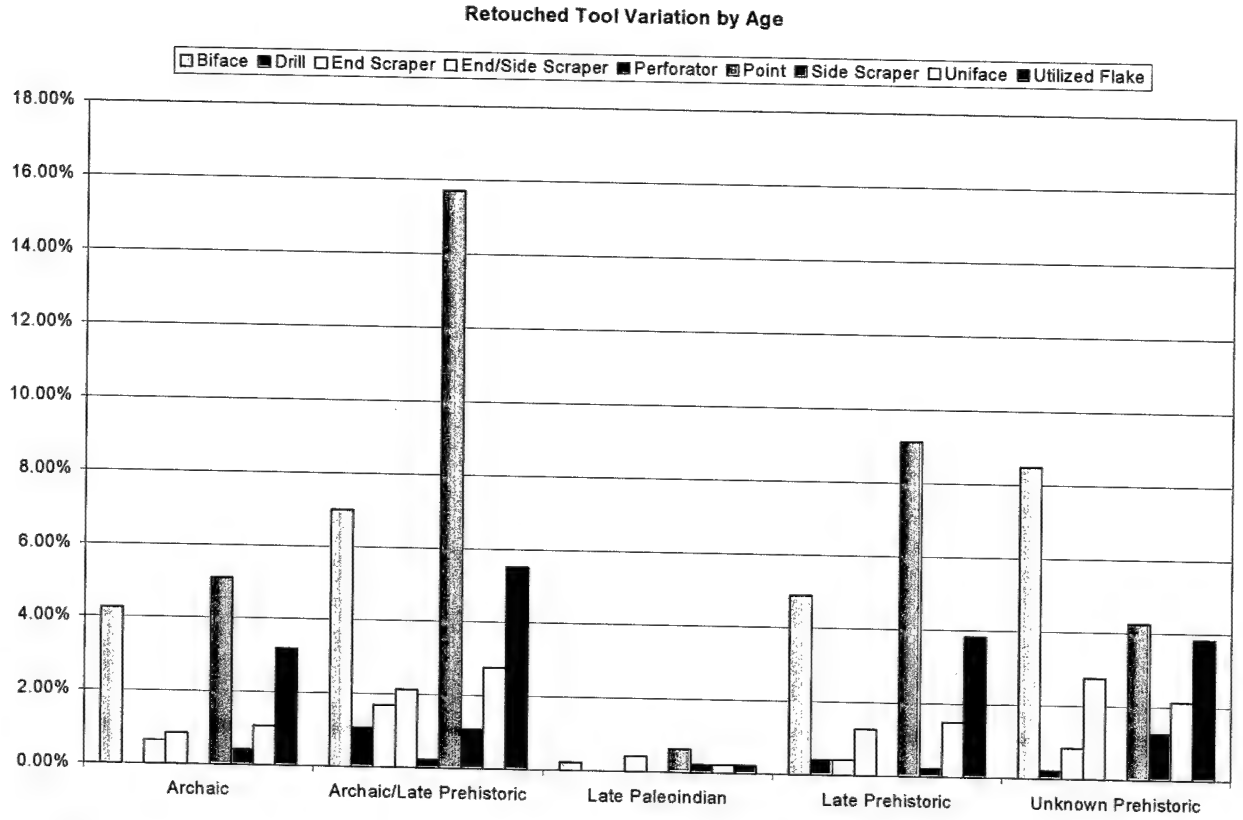


Figure 7.5: Retouched tool variation by age for Training Area 7 sites.

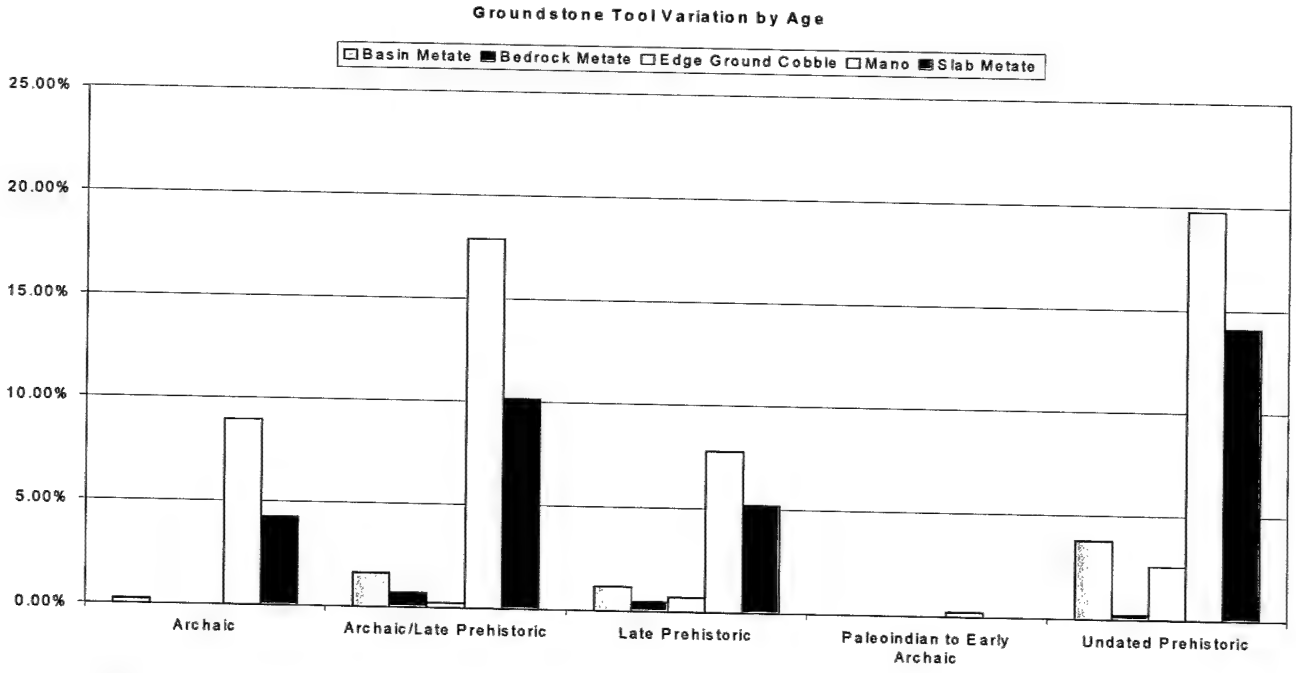


Figure 7.6: Ground stone tool variation by age for Training Area 7 sites.

Table 7.1: Prehistoric Site Data for the Four Topographic Units in Training Area 7.

Prehistoric Site Data	Steppes	Hogback	Canyons	Hills
Number of Sites	107	1	2	57
Total Number of Debitage Items	3286	0	118	1812
Average Number Debitage Items Per Site	30.7	0	59	31.7
Total Number of Stone Tools	314	0	13	271
Average Number Stone Tools Per Site	2.9	0	6.5	4.8
Total Number of Ground-Stone Tools	158	0	7	256
Total Number of Sites with Ground Stone	44	0	2	40
Average # of Ground-Stone Tools Per Site	3.6	0	3.5	6.4
Multiple Component Sites	7	1	0	8
Ratio of Flakes to Chipped-Stone Tools	10.46	0	9.07	6.68
Ratio of Chipped-Stone Tools to Ground Stone Tools	1.98	0	1.85	1.05
Ratio of Bifaces (Projectile Points) to Ground-Stone Tools	0.89	0	0.42	0.42

Surface artifacts from the steppe unit of Training Area 7 indicate hunting was a dominant site activity (314 total stone tools and a 2:1 ratio of chipped tools to ground tools). One might expect a high ratio of chipped stone to ground stone but the ratio is actually 3.6 ground-stone tools to 2.9 chipped-stone tools per site. The numbers of ground-stone tools are greater than expected and suggest a nearly equal emphasis on plant processing. The high ratio of debitage items and debitage to chipped-stone tools (10.46 pieces of debitage to every tool) reflects lithic procurement in the canyons and intermittent drainages throughout the area. Artifacts recovered from the grassy flats near the hogback suggest this was an area where outcropping lithic materials were frequently reduced to make preforms or other portable pieces of chipped-stone material.

In conclusion, the use of the chipped-stone tool, chipped-stone debitage analyses, and ground-stone analysis forms in the field portion of the project is an important addition to the information we are collecting from the surface of sites. As the database increases, it will be possible to make a number of meaningful statements about the differential use of the PCMS by the hunting and gathering cultures that inhabited it in the past.

BIBLIOGRAPHY

Adams, J.L.
1988 Use-Wear Analyses on Manos and Hide-Processing Stones. *Journal of Field Archaeology* 15:307-315.

Ahler, Stanley
1989 Mass Analysis of Flaking Debris: Studying the Forest Rather than the Tree. In *Alternative Approaches to Lithic Analysis*, edited by D.O. Henry and G.H. Odell, pp. 85-118. Archaeological Papers of the American Anthropological Association No. 1.

1989b Experimental knapping with KRF and midcontinent cherts: overview and applications. *In Methodological Contributions to Lithic Analysis*. D.S. Amick and R.P. Mauldin, eds. BAR International Series. In press.

1996 Redefinition of Chipped Stone Lithic Raw Material Types. In *Archaeological Investigations at Ceramic Stage Sites in the Pinon Canyon Maneuver Site, Colorado*. pp. 339-355, Contribution No. 308. Department of Anthropology, University of North Dakota, Grand Forks. Submitted to the National Park Service, Rocky Mountain Regional Office, Denver. Contract No. CX-1200-0-PO18.

Ahler, Stanley, and Robert Christensen
1983 *A Pilot Study of Knife River Flint Procurement and Reduction at Site 32DU508, a Quarry and Workshop Location in Dunn County, North Dakota.* Contribution No. 186. Department of Anthropology, University of North Dakota, Grand Forks.

Anderson, Jane L.
1989 Projectile Points. In *Temporal Assessment of Diagnostic Materials from the Pinon Canyon Maneuver Site,* edited by Christopher Lintz and Jane L. Anderson, pp. 111-316. Memoir No. 4. Colorado Archaeological Society.

Andrefsky, William, Jr., editor
1990a Analysis of Chipped Stone Artifacts from PCMS: An Introduction to Chipped Stone Analysis. *In An Introduction to the Archaeology of Pinon Canyon, Southeastern Colorado*, edited by William Andrefsky, Jr., pp. IX-1 – IX-7. Larson-Tibesar Associates, Laramie, Wyoming, and Centennial Archaeology, Fort Collins, Colorado. Submitted to the National Park Service, Rocky Mountain Regional Office, Denver. Contract No. CX-1200-7-BO54.

1990b *An Introduction to the Archaeology of Pinon Canyon, Southeastern Colorado.* 6 vols. Larson-Tibesar Associates, Laramie, Wyoming, and Centennial Archaeology, Fort Collins, Colorado. Submitted to the National Park Service, Rocky Mountain Regional Office, Denver. Contract No. CX-1200-7-BO54.

1994 Raw-Material Availability and the Organization of Technology. *American Antiquity* 59(1):21-34.

Andrefsky, William, Jr., Marilyn J. Bender, John D. Benko, and Judy K. Michaelsen
1989 *Test Excavations in the Pinon Canyon Maneuver Site, Southeastern Colorado.* 2 vols. Larson-Tibesar Associates, Laramie. Submitted to the National Park Service, Rocky Mountain Region, Interagency Archaeological Services, Denver. Contract No. CX 1200-7-B054. NTIS Accession No. not yet assigned.

Antevs, Ernst
1955 Geologic and Climatic Dating in the West. *American Antiquity* 20(4):317-335.

Barry, Roger G., and Richard J. Chorley
1987 *Atmosphere, weather and climate.* 5th edition. Methuen, New York, New York.

Belitz, B.
1979 *Brain Tanning the Sioux Way.* South Dakota: Pine Ridge Reservation Publication.

Bender, Marilyn J.
1990 Groundstone Analysis. In *An Introduction to the Archaeology of Pinon Canyon*, edited by W. Andrefsky, Jr., pp. X-1—x-61, Vol. II. Larson-Tibesar Associates, Laramie. Submitted to the National Park Service, Rocky Mountain Region, Interagency Archaeological Services, Denver. Contract No. CX 1100-7-B054. NTIS Accession No. PB90-192105.

Binford, L.R.
1977 Forty-seven Trips: A Case Study in the Character of Archeological Formation Processes. In *Stone Tools as Cultural Markers: Change, Evolution, and Complexity*, edited by R.V.S. Wright, pp. 24-36. Australian Institute of Aboriginal Studies, Canberra.

1979 Organization and Formation Processes: Looking at Curated Technologies. *Journal of Anthropological Research* 35(3): 255-273.

Binford, L.R., and N.M. Stone
1985 "*Righteous Rocks*" and Richard Gould: Some Observations on Misguided "Debate." *American Antiquity* 50(1): 151-153.

Butler, B. Robert
1966 *A Guide to Understanding Idaho Archaeology.* A Special Publication of the Idaho State University Museum, Pocatello.

Butler, William
1988 The Woodland Period in Northeastern Colorado. *Plains Anthropologist* 33 (122): 449-465.

Carrillo, Richard F.
1990 Historic Overview. In *An Introduction to the Archaeology of Pinon Canyon, Southeastern Colorado,* edited by William Andrefsky Jr., pp. XVIII-I-XVIII-42, Vol. III. Larson-Tibesar Associates, Laramie, Wyoming, and Centennial Archaeology, Fort Collins, Colorado. Submitted to the National Park Service, Rocky Mountain Regional Office, Denver. Contract No. CX-1200-7-BO54.

Chomko, S.
1997 Stone Structures Do Not a Permanent House Make. Paper presented at the 62nd Annual Meeting of the Society for American Archaeology, Nashville.

Cotterell, B., and J. Kamminga
1987 The formation of flakes. *American Antiquity* 52:675-708.

Crabtree, Don, and Earl H. Swanson, Jr.
1967 Edge-Ground Cobbles and Blade Making in the Northwest. *Tebiwa, The Journal of the Idaho State Museum,* Pocatello.

Crowley, Thomas J. and Gerald R. North
1968 *Paleoclimatology.* Oxford Monographs in Geology and Geophysics No. 18. Oxford University Press, New York.

Darroch, John I.
1974 *Edge-ground Cobbles: A Discussion.* Archaeology in Montana, Vol. 15, No. 2, Missoula.

Dean, J. Claire
1992 *Guidelines to the Regional Procedures for Archaeological Field and Laboratory Work at the Pinon Canyon Maneuver Site, Las Animas County, Colorado.* Manuscript submitted to the U.S. Army by the Department of Anthropology, University of North Dakota, Grand Forks.

Evanoff, E.
1998 *Results of the Field Study of the Surficial Geology and Paleontologic Resources of the Pinion Canyon Maneuver Site, Las Animas County, Colorado.* University of Colorado Museum. Boulder. Report submitted to the Midwest Archeological Center, National Park Service, Lincoln, Nebraska.

Ewers, John C.
1945 *Blackfeet Crafts.* Bureau of Indian Affairs, Branch of Education. Washington, D.C.

1958 *The Blackfeet: Raiders on the Northwestern Plains.* University of Oklahoma Press, Norman.

Fitzgerald, James P., Carron A. Meaney, and David M. Armstrong
1994 *Mammals of Colorado.* University Press of Colorado, Niwot, Colorado.

Friedman, Paul D.
1985 *History and Oral History Studies of the Fort Carson Pinon Canyon Maneuver Area, Las Animas County, Colorado.* Powers Elevation, Denver. Submitted to the National Park Service, Rocky Mountain Regional Office, Denver. Contract No. CX-1200-3-AO66.

Gunerson, J.H.
1987 *Archaeology of the High Plains.* Cultural Resource Series No. 19. Bureau of Land Management, Colorado State Office, Denver.

Hanson, Jeffery R., and Sally Chirinos
1989 Ethnohistory. In *Nine Rock Art Sites in the Pinon Canyon Maneuver Site, Southeastern Colorado,* by L.L. Loendorf, pp. 18-37. Contribution No. 248. Department of Anthropology, University of North Dakota, Grand Forks. Submitted to the National Park Service, Rocky Mountain Regional Office, Denver. Contract No. CX 1200-7-BO61.

Haury, Cherie
1989 History. *In Nine Rock Art Sites in the Pinon Canyon Maneuver Site, Southeastern Colorado,* by L.L. Loendorf, pp. 38-45. Contribution No. 248. Department of Anthropology, University of North Dakota, Grand Forks. Submitted to the National Park Service, Rocky Mountain Regional Office, Denver. Contract No. CX 1200-7-BO61.

Hummer, Anne G.
1989 Prehistoric Ceramics. In *Temporal Assessment of Diagnostic Materials from the Pinon Canyon Maneuver Site*, edited by Christopher Lintz and Jane L. Anderson, pp. 316-374. Memoir No. 4. Colorado Archaeological Society.

Johnson, Claudia C.
1984 *The Geologic Assessment of the Pinon Canyon Archaeological Project Site Southeastern Colorado.* University of Colorado. Submitted to Mark Guthrie, University of Denver.

Kalasz, Stephen M.
1989 Prehistoric Architectural Remains. In *Temporal Assessment of Diagnostic Materials from the Pinon Canyon Maneuver Site*, edited by Christopher Lintz and Jane L. Anderson. pp. 86-110. Memoir No. 4. Colorado Archaeological Society.

Kewanwytewa, Jim, and Katharine Bartlett
1946 "Hopi Moccasin Making," *Plateau* 19(1):21-28.

Kluckhohn, Clyde, W. W. Hill, and Lucy W. Kluckhohn
1971 *Navajo Material Culture.* Belknap Press of Harvard University Press, Cambridge, Massachusetts

Kvamme, Kenneth
1984 Models of Prehistoric Site Location Near Piñon Canyon, Colorado. In *Papers of the Philmont Conference on the Archaeology of Northeastern New Mexico,* edited by Carol J. Condie, 347-370. Proceedings of the New Mexico Archeological Council 6(1). Albuquerque

1988 Development and Testing of Quantitative Models. In *Quantifying the Present and Predicting the Past: Theory, Method, and Application of Archaeological Predictive Modeling,* edited by W. J. Judge and L. Sebastian, 325-428. U.S. Government Printing Office, Washington, D.C.

1989 Predictive Cultural Resource Modeling at Pinon Canyon: 1984-85. In *An Introduction to the Archaeology of Pinon Canyon, Southeastern Colorado. Vol I: Background and Methods*, edited by William Andrefsky, Jr., IV pp. 6-83. Larson-Tibesar Associates, Laramie, Wyoming, and Centennial Archaeology, Fort Collins, Colorado. Submitted to the National Park Service, Rocky Mountain Regional Office, Denver. Contract No. CX-1200-7-BO54.

1992 A Predictive Site Location Model on the High Plains: An Example with an Independent Test. *Plains Anthropologist* 37 (138): 19-39.

Laubin, Reginald, and Gladys Laubin
1957 *The Indian Tipi.* University of Oklahoma Press, Norman.

Lintz, Christpher, and Jane Anderson
1989 *Temporal Assessment of Diagnostic Materials from the Pinon Canyon Maneuver Site.* Memoir No. 4. Colorado Archaeological Society.

Loendorf, Lawrence L.
1989 *Nine Rock Art Sites in the Pinon Canyon Maneuver Site, Southeastern Colorado.* Contribution No. 248. Department of Anthropology, University of North Dakota, Grand Forks.

Loendorf, L.L., J.L. Borchert, and D.G. Klinner
1996 *Archaeological Investigations at Ceramic Stage Sites in the Pinon Canyon Maneuver Site, Colorado.* Contribution No. 308. Department of Anthropology, University of North Dakota, Grand Forks. Submitted to the National Park Service, Rocky Mountain Regional Office, Denver. Contract No. CX-1200-0-PO18.

Loendorf, Lawrence, and Christopher Loendorf
1998 Archaeological Sites in Welsh Canyon, Las Animas County, Colorado. Report submitted to the Midwest Archeological Center, National Park Service, Lincoln, Nebraska.

Lowie, Robert H.
1963 *Indians of the Plains.* American Museum Science Books Edition, The Natural History Press, Garden City, New York.

Mails, Thomas E.
1995 *The Mystic Warriors of the Plains.* Marlowe & Company. New York, N.Y.

NRHP (National Register of Historic Places)
1990 *How to Apply the National Register Criteria for Evaluation.* National Register Bulletin 15, National Park Service, Washington, D.C.

Owens Mark, Christopher R. Loendorf, Vincent Schiavitti, and Lawrence L. Loendorf
2000 Archaeological Sites Inventory in the Black Hills of the Piñon Canyon Maneuver Site, Las Animas County, Colorado. Report submitted to the Midwest Archeological Center, National Park Service, Lincoln, Nebraska.

Parry, W. J., and R. L. Kelly
1987 Expedient Core Technology and Sedentism. In *The Organization of Core Technology,* edited by J. K. Johnson and C. A. Morrow, pp. 285-304. Westview Press, Boulder.

Pettit, Jan
1991 *Utes: The Mountain People.* Johnson Books, Boulder.

Schiavitti, Vincent, Lawrence Loendorf, and Erica Hill
1999 *Archaeological Investigations at Eleven Sites of Welsh Canyon in the Pinon Canyon Maneuver Site, Las Animas County, Colorado.* Submitted to the Midwest Archeological Center, National Park Service, Lincoln, Nebraska.

Schuldenrein, J.D., M. Helgren, H. E. Jacson and A. Pitty
1985 *Geomorphological and Geoarchaeological Investigations at the U. S. Army Fort Carson-Pinon Canyon Maneuver Site, Las Animas County, Colorado.* Gilbert/Commonwealth, Jackson Michigan. Submitted to the National Park Service, Rocky Mountain Regional Office, Denver. Contract No. CX-1200-3-AO64.

Shaw, R.B., S.L. Anderson, K.A. Schultz, and V.E. Diersing
1989 *Plant Communities, Ecological Checklist, and Species List for the U.S. Army Pinon Canyon Maneuver Site, Colorado.* Science Series No. 37. Department of Range Science, Colorado State University. Fort Collins. Submitted to the U.S. Army Corp of Engineers, Engineering and Housing Support Center.

Siemer, Eugene G.
1977 *Colorado Climate.* Colorado Experimental Station.

Underhill, Ruth
1944 *Pueblo Crafts.* Bureau of Indian Affairs, Branch of Education, Washington, D.C.

Wallace, Ernest, and E. Adamson Hoebel
1952 *The Comanches: Lords of the South Plains.* University of Oklahoma Press, Norman.

Zier, C.J., and S. M. Kalasz
1999 *The Prehistory of Colorado: The Arkansas River Basin.* Colorado Historical Society, Denver.

APPENDIX A

1999 TRAINING AREA 7
FIELD DATABASE GROUND-STONE ANALYSIS KEY

SITE NUMBER:	Record LA site number.
FS #	Record Field Specimen or Bag Number.
CONTEXT/FEATURE	Record Loci or Feature Number if necessary.

TYPES:

Basin Metate	Mano
Bedrock Metate	Polishing Stone
Celt	Shaft Straightener
Edge-Ground Cobble/Mano	Slab Metate
Hammerstone/Mano	Unknown Fragment

MATERIALS:

Basalt	Quartzite
Conglomerate	Sandstone
Diorite	Schist
Granite	Tuff
Quartz	

OVERALL CONDITION

< 50%
> 50%
Whole

LENGTH:	Measure in mm.
WIDTH:	Measure in mm.
THICKNESS:	Measure in mm.

BURNING:

Yes
No

SURFACE DESIGNATION: Designate letter of each utilized area.

CONDITION (use area only)

< 50%
> 50%
Whole

Appendix A continued.

TECHNOLOGY:

Ground	N/A
Ground/Battered	Pecked
Ground/Pecked	Polished

SHAPE:

Irregular	Round
N/A	Square
Oval	Undetermined
Rectangular	

STRIATIONS:

Circular	Oblique
Longitudinal	Transverse
Multiple	Undetermined
N/A	

USE WEAR:

Heavy
Light
Moderate
N/A

USE WEAR LENGTH: Record in mm

USE WEAR WIDTH: Record in mm

METATE DEPTH: Record in mm.

APPENDIX B

1999 TRAINING AREA 7
FIELD DATABASE CHIPPED-STONE TOOL ANALYSIS KEY

SIZE GRADE:
Large (>1")
Medium (>1/2")
Small (<1/2")

TYPES:

Small Thin Patterned Biface	1
Large Thin Patterned Biface	2
Other Unfinished Large Patterned Biface	3
Patterned Flake Tool (Scraper, Drill)	4
Retouched/Utilized Flake	5
Large Crude Bifacial Core-Tool	6
Non-Bipolar Core	7
Bipolar Core	8

MATERIALS:

Sandstone	Basalt
Granite	Diorite
Schist	Coarse-grained Quartzite
Fine-Grained Quartzite	Limestone
Chert	Conglomerate
Hornfels/Basalt	Orthoquartzite
Dendritic Chert	Pedernal Chert
Alibates Dolomite	Chalcedony
Silicified Wood	Argillite
Obsidian	

CORTEX:
Present
Absent

APPENDIX C

1999 TRAINING AREA 7
FIELD DATABASE DEBITAGE ANALYSIS KEY

SIZE GRADE:
Large (>1")
Medium (>1/2")
Small (<1/2")

TYPES:
Shatter
Simple Flake
Complex Flake
Biface-thinning Flake
Bipolar Flake

MATERIALS:

Sandstone	Basalt
Granite	Diorite
Schist	Coarse-Grained Quartzite
Fine-Grained Quartzite	Limestone
Chert	Conglomerate
Hornfels/Basalt	Orthoquartzite
Dendritic Chert	Pedernal Chert
Alibates Dolomite	Chalcedony
Silicified Wood	Argillite
Obsidian	

CORTEX:
Present
Absent

APPENDIX D

1999 TRAINING AREA 7
EDGE-GROUND COBBLE/MANO ANALYSIS KEY

SITE NUMBER: Last four digits of site number
FS # Record Field Specimen or Bag Number.
INVENTORY NUMBER: Lab Inventory Number

MATERIALS:

Basalt	Quartzite
Conglomerate	Sandstone
Diorite	Schist
Granite	Tuff
Quartz	

GRAIN:
Fine
Medium
Coarse

SPECIFIC GRAVITY:
High
Low

LENGTH: Measure in mm.
WIDTH: Measure in mm.
THICKNESS: Measure in mm.
WEIGHT: Measure in 0.1 gr.

VARIETY:
Cobble
Nodule
Chunk/Block
Split Cobble
Tabular Chunk

X-SECTION:
Oval
Triangular
Plano-convex
Round
Biconvex
Flattened
Rhomboid

Appendix D continued.

OUTLINE:

Irregular	Circular
Oval	Subrectangular
Subsquare	Triangular
Trapezoidal	

FACET #: Number of utilized or modified surfaces

EDGES:
Single
Double
Multiple

BEVELS:
Single
Double
Triple
Four

STRIATIONS:

Oblique	Transverse
Longitudinal	Multiple
Circular	
N/A	

DEGREE: Angle of striations in degrees

USE ANGLE: Angle of working edge in degrees

BATTERING:
Yes
No

ABRASION/MOD:
Yes
No

STAGE:
Early
Middle
Late

USE WEAR:
Abrasion
Polish
Ground
Ground/Polished

Appendix D continued.

SURFACE DESIGNATION: Designate letter of each utilized area.

CONDITION (use area only)
< 50%
> 50%
Whole

PASSIVE/ACTIVE:
Passive
Active
Can't Tell

EDGE PLAN:
Straight
Concave
Convex

MANO USE:
Yes
No

WELENGTH: Working edge length to nearest mm
WEWIDTH: Working edge width to nearest mm

APPENDIX E

1999 TRAINING AREA 7
RETOUCHED/UTILIZED ARTIFACT ANALYSIS CODES

SITE NUMBER:	Last four digits of site number
FS #	Record Field Specimen or Bag Number.
INVENTORY NUMBER:	Lab Inventory Number

MATERIALS:

Sandstone	Basalt
Granite	Diorite
Schist	Coarse-Grained Quartzite
Fine-Grained Quartzite	Limestone
Chert	Conglomerate
Hornfels/Basalt	Orthoquartzite
Dendritic Chert	Pedernal Chert
Alibates Dolomite	Chalcedony
Silicified Wood	Argillite
Obsidian	

WEIGHT:	In grams to the nearest1/10 gram (0.1)
LENGTH:	In millimeters to the nearest millimeter
WIDTH:	In millimeters to the nearest millimeter
THICKNESS:	In millimeters to the nearest millimeter

BROKEN:
Yes
No

ARTIFACT TYPE:

End Scraper	1
Side Scraper	2
End/Side Scraper	3
Uniface	4
Biface	5
Spokeshave	6
Drill	7
Perforator	8
Utilized Flake	9

CORTEX:
Absent
Less than or equal to 50%
Greater than 50%

Appendix E continued.

STAGE:
Unfinished, these artifacts lack use wear (Stage 1 bifaces)
Nearly Finished, May exhibit some light use wear but lacks formalized shape (Stage 2 bifaces)
Finished, May exhibit use wear and has formalized shape

USE WEAR:
Absent
Light
Moderate
Heavy

EDGES:

Platform	Right Lateral
Distal	Left Lateral
Unknown	Irregular

EDGES USED: Total Number Used

USE PRESENT/ABSENT:
Absent
Present

EDGE ANGLE:
Less Than 45 degrees
Greater Than 45 degrees

DEGREE:
Light
Moderate
Heavy

SIDES:
One Face
Both Faces

APPENDIX F

Flora found in Training Area 7.

Common Name	Scientific Name	Woodland	Shrubland	Grassland
Snowball Sandverbena	*Abronia fragrans*	X		
Crested Wheatgrass	*Agropyron cristatum*	X		X
Thickspike Wheatgrass	*Agropyron dasystachyum*		X	X
Western Wheatgrass	*Agropyron smithii*	X	X	X
Redtop Bentgrass	*Agrostis stolonifera*	X	X	
Waterplantain	*Alisma sp.*	X		
American Waterplantain	*Alisma triviale*	X		
Textile Onion	*Allium textile*	X	X	X
Tumbleweed	*Amaranthus albus*		X	
Amaranth (pigweed)	*Amaranthus graecizans*		X	
Rough Pigweed	*Amaranthus retroflexus*		X	
Annual Bursage	*Ambrosia acanthicarpa*	X		
Western Ragweed	*Ambrosia psilostachya*		X	X
Saskatoon Serviceberry	*Amelanchier alnifolia*		X	
False Indigo	*Amorpha fructicosa*		X	
Dwarf Indigo Amorpha	*Amorpha nana*	X	X	
Big Bluestem	*Andropogon gerardii*	X		
Pussytoes	*Antennaria obovata*	X		
Littleleaf Pussytoes	*Antennaria parvifolia*	X		
Indian Hemp	*Apocynum cannabinum*		X	
Common Burdock	*Arctium minus*	X	X	
Hooker Sandwort	*Arenaria hookeri*	X	X	
Hedgehog Pricklypoppy	*Argemone hispida*		X	X
Sixweeks Threeawn	*Aristida adscensionis*	X		
Poverty Threeawn	*Aristida divaricata*		X	
Fendler Threeawn	*Aristida fendleriana*	X	X	X
Red Threeawn	*Aristida longiseta*	X	X	X
Purple Threeawn	*Aristida purpurea*	X	X	
Bigelow Sagebrush	*Artemiaia bigelovii*	X	X	X
Wild Tarragon	*Artemiaia dracunculus*	X	X	X
Sand Sagebrush	*Artemisia filifolia*		X	X
Fringed Sagebrush	*Artemisia frigida*		X	
Louisiana Sagebrush	*Artemisia ludoviciana*	X	X	
Sand Milkweed	*Asclepias arenaria*		X	
Antelope Horns	*Asclepias asperula*	X		
Engleman Milkweed	*Asclepias engelmanniana*		X	
Swamp Milkweed	*Asclepias incarnata*	X	X	
Longhorn Milkweed	*Asclepias macrotis*	X		
Showy Milkweed	*Asclepias speciosa*		X	
Poison Milkweed	*Asclepias subverticillata*		X	
Whorled Milkweed	*Asclepias verticillata*		X	
Green Milkweed	*Asclepias viridiflora*	X		
White Aster	*Aster ericoides*	X	X	
Whiteprarie Aster	*Aster falcatus*	X	X	
Missouri Milkvetch	*Astragalus missouriensis*		X	X
Trinidad Milkvetch	*Astragalus puniceus*	X		
Alkali Milkvetch	*Astragalus racemosus*		X	
Shorts Milkvetch	*Astragalus shortianus*		X	
Groundplum Milkvetch	*Astragalus crassicarpus*	X		
Slender Milkvetch	*Astragalus gracilis*		X	X

Appendix F continued.

Tumbling Saltbush	*Atriplex argentea*	X		
Fourwing Saltbush	*Atriplex canescens*	X	X	X
Wild Oat	*Avena fatua*	X		
Wright Baccharis	*Baccharis wrightii*		X	
Silver Bluestem	*Bothriochloa saccharoides*	X	X	
Sideoats Grama	*Bouteloua curtipendula*	X	X	X
Black grama	*Bouteloua eriopoda*	X	X	X
Blue Grama	*Bouteloua gracilis*	X	X	X
Hairy Grama	*Bouteloua hirsuta*	X	X	
Bricklellbush	*Brickellia brachyphylla*	X	X	
California Brickellbush	*Brickellia californica*	X	X	X
Japanese Brome	*Bromus japonicus*	X	X	X
Buffalograss	*Buchloe dactyloides*		X	
James Rushpea	*Caesalpinia jamesii*	X	X	
Slimstem Reedgrass	*Calamagrostis neglecta*		X	
Gunnison Mariposalily	*Calochortus gunnisonii*	X	X	
Lavenderleaf Evening Primrose	*Calylophus hartwegii*			X
Littlepod Falseflax	*Camelina microcarpa*			X
Sedge	*Carex brevior*	X		
Sedge	*Carex foena*	X		
Heavy Sedge	*Carex gravidia*		X	
Woolly sedge	*Carex lanuginosa*		X	
Sedge	*Carex xerantica*	X		
Orange Paintbrush	*Castilleja integra*	X	X	
Downey Paintbrush	*Castilleja sessiliflora*		X	
Netleaf Hackberry	*Celtis reticulata*	X	X	
Sandbur	*Cenchrus longispinus*		X	
Knapweed	*Centaurea repens*	X	X	X
Common Winterfat	*Ceratoides lanata*	X	X	X
True Mountain Mahogany	*Cerocarpus montanus*	X	X	X
Green False Nightshade	*Chamaesaracha coronopus*	X		X
Lambsquarters Goosefoot	*Chenopodium album*	X	X	
Goosefoot	*Chenopodium incanum*		X	X
Slimleaf Goosefoot	*Chenopodium leptophyllum*	X	X	
Rabbitbrush	*Chrysothamnus nauseosus*	X	X	X
Wavyleaf Thistle	*Cirsium undulatum*	X	X	
Western Virginsbower	*Clematis ligusticifolia*		X	
Rocky Mountian Beeplant	*Cleome serrulata*	X	X	
Bastard Toadflax	*Comandra umbellata*		X	
Poison Hemlock	*Conium maculatum*	X		X
Field Bindweed	*Convolvulus arvensis*		X	X
Bindweed	*Convolvulus equitans*		X	
Canadian Horseweed	*Conyza canadensis*	X	X	
Plains Coreopsis	*Coreopsis tinctoria*		X	
Goldensmoke	*Corydalis aurea*	X	X	
Pincushion Cactus	*Coryphantha vivipara*	X	X	
Texas Croton	*Croton texensis*	X		
James Cryptantha	*Cryptantha cinerea*	X	X	
Cryptantha	*Cryptantha minima*	X	X	
Cluster Cryptantha	*Cryptantha thyrsiflora*	X	X	
Buffalo Gourd	*Cucurbita foetidissima*		X	X
Mountain Spring Parsely	*Cymopterus montanus*	X	X	X
Fern Flatsedge	*Cyperus filiculmis*	X	X	
Schwienitz Flatsedge	*Cyperus schweinitzii*	X	X	
Orchardgrass	*Dactylis glomerata*		X	
Silktop Dalea	*Dalea aurea*			X

Appendix F continued.

White Prairie Clover	*Dalea candida*		X	
Indigo Bush	*Dalea enneandra*		X	
James Dalea	*Dalea jamesii*	X		
Purple Prairie Clover	*Dalea purpurea*	X	X	
Wooton Larkspur	*Delphinium virescens*		X	X
Plains Larkspur	*Delphinium virescens*			X
Pinnate Tansymustard	*Descurainia pinnata*	X	X	X
Flixweed Tansymustard	*Descurainia sophia*		X	
Scribner Panicum	*Dichanthelium oligosanthes*	X	X	
Inland Saltgrass	*Distichlis spicata*		X	
Carolina Draba	*Draba reptans*	X	X	X
Dogweed	*Dyssodia aurea*	X	X	X
Hedgehog Cactus	*Echinocereus viridiflorus*	X	X	X
Barnyard Grass	*Echinochloa crusgalli*		X	
Spikesedge	*Eliocharis*	X		
Common Spikesedge	*Eliocharis palustris*		X	
Canada Wildrye	*Elymus canadensis*	X	X	
Smooth Horsetail	*Equisetum laevigatum*		X	
Variegated Horsetail	*Equisetum variegatum*		X	
Stink Grass	*Eragrostis cilianensis*		X	
Purple Lovegrass	*Eragrostis spectabilis*	X		
Spreading Fleabane	*Erigeron divergens*	X	X	X
Low Fleabane	*Erigeron pumilus*		X	
Annual Eriogonum	*Eriogonum annuum*	X	X	X
Bushy Eriogonum	*Eriogonum effusum*	X	X	X
James Eriogonum	*Eriogonum jamesii*	X	X	X
Eriogonum	*Eriogonum lachnogynum*	X	X	
Matted Wild Buckwheat	*Eriogonum tenellum*	X	X	X
Sulphur Eriogonum	*Eriogonum umbellatum*	X	X	
Hairy False Tridens	*Erioneuron pilosum*	X	X	X
Filaree	*Erodium cicutarium*	X	X	
Western Wallflower	*Erysimum asperum*		X	X
Toothed Euphorbia	*Euphorbia dentata*		X	
Fendler Euphorbia	*Euphorbia fenderi*	X		
Ridgeseed Euphorbia	*Euphorbia glyptosperma*		X	X
Hoary Euphorbia	*Euphorbia lata*		X	
Snow on the Mountain Euphorbia	*Euphorbia marginata*	X		X
Missouri Euphorbia	*Euphorbia missurica*			X
Round-Leafed Spurge	*Euphorbia serpens*			X
Spurge	*Euphorbia spathulata*	X	X	X
Mat Spurge	*Euphorbia stictospora*			X
Fluffweed	*Evax prolifera*		X	
Arizona Evolvulus	*Evolvulus nuttallianus*	X	X	X
James Frankenia	*Frankenia jamesii*	X	X	
Blanket Flower	*Gaillardia pinnatifida*		X	X
Scarlet Gaura	*Gaura coccinea*	X	X	X
Smallflower Gaura	*Gaura parviflora*			X
Gilia	*Gilia acerosa*	X		
Greasebush	*Glossopetalon meionandra*	X	X	
Fowl Mannagrass	*Glyceria stricta*	X		
American Licorice	*Glycyrrhiza lepidota*		X	
Curlycup Gumweed	*Grindelia squarrosa*	X	X	X
Broom Snakeweed	*Gutierrezia sarothrae*	X	X	X
Fremont Goldenweed	*Haplopappus fremontii*	X	X	X
Rayless Goldenweed	*Haplopappus monocephalus*	X	X	X

Appendix F continued.

Spiny Goldenweed	*Haplopappus spinulosus*	X	X	X
Drummond False Pennyroyal	*Hedeoma drummondii*	X	X	
Northern Sweetvetch	*Hedysarum boreale*	X		
Annual Sunflower	*Helianthus annuus*		X	X
Prairie Sunflower	*Helianthus petiolaris*	X	X	X
Goldaster	*Heterotheca horrida*	X	X	X
Hairy Goldenaster	*Heterotheca villosa*	X	X	X
Littleleaf Alumroot	*Heuchera parvifolia*	X		
Galleta	*Hilaria jamesii*	X	X	X
Sicklepod Rushpea	*Hoffmanseggia drepanocarpa*	X		
Foxtail Barley	*Hordeum jubatum*	X	X	X
Little Barley	*Hordeum pusillum*	X	X	X
Fine Leaf Hymenopappus	*Hymenopappus filifolius*	X		
Hymenopappus	*Hymenopappus tenuifolius*	X	X	
Stemless Hymenoxys	*Hymenoxys acaulis*	X	X	X
Bush Morning-glory	*Ipomoea leptophylla*	X		X
Gilia	*Ipomopsis laxiflora*	X	X	X
Dwarf Gilia	*Ipomopsis pumila*	X	X	X
Spike Gilia	*Ipomopsis spicata*	X		X
Povertyweed	*Iva axillaris*		X	
Baltic Rush	*Juncus balticus*		X	
Inland Rush	*Juncus interior*	X	X	
Torrey Rush	*Juncus torreyi*		X	
One-seeded Juniper	*Juniperus monosperma*	X	X	X
Rocky Mountain Juniper	*Juniperus scopulorum*	X	X	
Kochia	*Kochia scoparia*	X	X	X
Prairie Junegrass	*Koeleria pyramidata*		X	
Prickly Lettuce	*Lactuca serriola*	X	X	X
Chicory Lettuce	*Lactuca tatarica*		X	
Cupseed Stickseed	*Lappula diploloma*	X	X	X
Blueburr Stickseed	*Lappula redowskii*	X	X	X
Bush Peavine	*Lathyrus eucosmus*			X
Fendlers Bladderpod	*Lesquerella fendleri*	X	X	X
Heath Aster	*Leucelene ericoides*	X	X	X
Sand Lily	*Leucocrinum montanum*		X	X
Dotted Gayfeather	*Liatris punctata*		X	
Lewis Flax	*Linum lewisii*		X	X
Yellow Flax	*Linum rigidum*	X	X	X
Narrowleaf Gromwell	*Lithospermum incisum*	X	X	X
Cardinal Flower	*Lobelia cerdinalis*		X	
Oriental Lomatium	*Lomatium orientale*	X	X	
Rusty Lupine	*Lupinus pusillus*			X
Pale Wolfberry	*Lycium pallidum*	X	X	X
Common Wolftail	*Lycurus phleoides*	X	X	
Rush Skeletonplant	*Lygodesmia juncea*		X	X
Common Hoarhound	*Marrubium vulgare*	X	X	X
Devils Claw	*Martynia louisianica*	X	X	X
Plains Blackfoot	*Melampodium cinereum*	X	X	X
White Sweetclover	*Melilotus alba*	X	X	
Yellow Sweetclover	*Melilotus officinalis*	X	X	
Whitestem Mentzelia	*Mentzelia albicaulis*		X	
Bractless Mentzelia	*Mentzelia nuda*	X	X	X
Stickleaf	*Mentzelia oligosperma*		X	
Hairy Unbrellawort	*Mirabilis hirsuta*	X		
Narrowleaved Unbrellawort	*Mirabilis linearis*			X
Colorado Four-O'Clock	*Mirabilis multiflora*		X	X

Appendix F continued.

Pony Beebalm	*Monarda pectinata*		X	X
Ear Muhly	*Muhlenbergia arenacca*		X	X
Sand Muhly	*Muhlenbergia arenicola*	X		X
Alkali Muhly	*Muhlenbergia asperifolia*	X	X	X
Green Muhly	*Muhlenbergia racemosa*	X		
Ring Muhly	*Muhlenbergia torreyi*	X	X	X
False Buffalograss	*Munroa squarrosa*		X	X
Leafy Musineon	*Musineon divaricatum*	X	X	X
False Dandelion	*Nothocalais cuspidata*			X
Tufted Evening Primrose	*Oenothera caespitosa*			X
Evening Primrose	*Oenothera harringtonii*	X		X
Western Marbleseed	*Onosmodium molle*		X	
Tree Cholla	*Opuntia imbricata*	X	X	X
Prickly Pear	*Opuntia phaeacantha*	X	X	X
Plains Prickly Pear	*Opuntia polycantha*	X	X	X
Hoary Prickly pear	*Opuntia trichophora*	X	X	
Broomrape	*Orobanche multiflora*	X	X	X
Indian Ricegrass	*Oryzopsis hymenoides*	X	X	X
Littleseed Ricegrass	*Oryzopsis micrantha*	X		
Lambert Crazyweed	*Oxytropis lambertii*		X	
Palafoxia	*Palafoxia rosea*	X	X	X
Common Witchgrass	*Panicum capillare*	X		X
Vine Mesquite	*Panicum obtusum*	X	X	X
Switchgrass	*Panicum virgatum*	X		
Pennsylvania Pellitory	*Parietaria pennsylvanica*		X	
Creeping Nailwort	*Paronychia sessiliflora*	X	X	
Thicket Creeper	*Parthenoccissus vitacea*		X	
Fetid-Marigold	*Pectis angustifolia*		X	
Narrowleaf Penstemon	*Penstemon angustifolius*	X	X	X
Penstemon	*Penstemon auriberbis*	X	X	
Torrey Penstemon	*Penstemon barbatus*	X	X	
Littleleaf Mockorange	*Philadelphus microphyllus*	X	X	
Timothy	*Phleum pratense*		X	
Longleaf Phlox	*Phlox longifolia*			
Common Red Reed	*Phragmites communis*	X	X	
Wedgeleaf Fogfruit	*Phyla cunefolia*		X	
Clammy Groundcherry	*Physalis hederifolia*	X	X	
Purpleflower Groundcherry	*Physalis lobata*	X		X
Taperleaf Groundcherry	*Physalis longifolia*	X	X	
Longleaf Groundcherry	*Physalis longifolia*	X	X	
Mountain Ninebark	*Physocarpus monogynus*		X	
Plains Bahia	*Picradeniopsis oppositifolia*		X	X
Pinyon Pine	*Pinus edulis*	X		
Ponderosa Pine	*Pinus ponderosa*	X		
Wooly Plantain	*Plantago patagonica*	X	X	X
Bigelow Bluegrass	*Poa bigelovii*		X	
Kentuky Bluegrass	*Poa pratensis*	X	X	
Sandberg Bluegrass	*Poa sandbergii*	X	X	
Clammyseed	*Polanisia dodecandra*		X	
Rabbitfoot Polypogon	*Polypogon monspeliensis*	X	X	
Plains Cottonwood	*Populus deltoides*	X		X
Quaking Aspen	*Populus tremuloides*	X		
Common Purslane	*Portulaca oleracca*			X
Purslane	*Portulaca parvula*		X	
White Cinquefoil	*Potentilla arguta*	X		
American Plum	*Prunus americana*	X	X	

Appendix F continued.

Pin Cherry	*Prunus pensylvanica*	X	X	
Common Chokecherry	*Prunus virginiana*		X	
Slimeflower Scurfpea	*Psoralea tenuiflora*	X	X	X
Common Hoptree	*Ptelea trifoliata*	X	X	
Upright Prairie Coneflower	*Ratibida columnifera*		X	
Shortray Prairie Coneflower	*Ratibida tagetes*		X	
Skunkbush Sumac	*Rhus trilobata*	X	X	
Golden Currant	*Ribes aureum*	X	X	
Wax Currant	*Ribes cereum*	X	X	
Trumpet Gooseberry	*Ribes leptanthum*	X	X	
Wood Rose	*Rosa woodsii*	X		
Boulder Raspberry	*Rubus deliciosus*		X	
Curly Dock	*Rumex crispus*	X	X	
Narrowleaf Dock	*Rumex stenophyllus*		X	
Common Arrowhead	*Sagittaria latifolia*	X		
Peachleaf Willow	*Salix anygdaloides*	X	X	
Sandbar Willow	*Salix exiqua*		X	
Willow	*Salix sp.*		X	
Russian Thistle	*Salsola iberica*	X	X	X
Lanceleaf Sage	*Salvia reflexa*	X	X	
American Elder	*Sambucus canadensis*	X	X	
Southern Soapberry	*Sapindus saponaria*		X	
Black Greasewood	*Sarcobatus vermiculatus*		X	
Tumblegrass	*Schedonnardus paniculatus*	X	X	X
Little Bluestem	*Schizachyrium scoparium*	X	X	
Tule Bulrush	*Scirpus acutus*		X	
American Bulrush	*Scirpus americanus*		X	
Bulrush	*Scirpus pallidus*	X		
Burrograss	*Scleropogon brevifolius*		X	X
Golden Groundsel	*Senecio pseudaureus*	X	X	X
Riddell Groundsel	*Senecio riddellii*			X
Groundsel	*Senecio tridenticulatus*	X	X	
Squirreltail	*Sitanion hystrix*	X	X	X
Silverleaf Nightshade	*Solanum elaeagnifolium*	X	X	X
Black Nightshade	*Solanum nigrum*		X	
Buffalobur Nightshade	*Solanum rostratum*	X	X	X
Cutleaf Nightshade	*Solanum triflorum*		X	
Velvity Goldenrod	*Solidago mollis*	X	X	
Goldenrod	*Solidago multiradiata*		X	
Downey Goldenrod	*Solidago petiolaris*	X	X	
Three-nerved Goldenrod	*Solidago sparsiflora*		X	
Silky Sophora	*Sophora nuttalliana*		X	X
Indiangrass	*Sorghastrum nutans*	X		
Narrowleaf Globemallow	*Sphaeralcea angustifolia*	X	X	
Scarlet Globemallow	*Sphaeralcea coccinea*	X	X	X
Wedgegrass	*Sphenopholis obtusata*	X		
Alkali Sacaton	*Sporobolus airoides*	X	X	X
Sand Dropseed	*Sporobolus cryptandrus*	X	X	X
Princess Plume	*Stanleya pinntata*	X	X	X
Desert Wirelettuce	*Stephanomeria pauciflora*		X	
Needle and Thread	*Stipa comata*	X	X	X
New Mexico Feathergrass	*Stipa neomexicana*	X	X	X
Sleepygrass	*Stipa robusta*		X	
Scribner Needlegrass	*Stipa scribneri*		X	
Green Needlegrass	*Stipa viridula*			X
Western Snowberry	*Symphoricarpos occidentalis*		X	

Appendix F continued.

Mountain Snowberry	*Symphoricarpos oreophilus*	X	X	
Prairie Flameflower	*Talinum parviflorum*	X		
Five-stamen Tamarix	*Tamarix pentandra*	X	X	
Common Dandelion	*Taraxacum officinale*		X	
Cutleaf Germander	*Teucrium lacinitum*	X	X	X
Greenthread	*Thelesperma megapotamicum*	X	X	
Navajo-tea Greenthread	*Thelesperma subnudum*	X	X	X
Wright Thelypody	*Thelypodium wrightii*	X		
Easter Daisy	*Townsendia hookerii*	X	X	X
Poison ivy	*Toxicodendron rybergii*		X	
Prairie Spiderwort	*Tradescantia occidentalis*	X	X	X
Noseburn	*Tragia nepetaefolia*	X	X	X
Western Salsify	*Tragopogon dubius*		X	X
Puncture Vine	*Tribulus terrestris*		X	
Green Tridens	*Tridens elongatus*	X	X	X
Sandpuff	*Tripterocalyx micranthus*	X		
Narrowleaf Cattail	*Typha angustifolia*	X	X	
Common Cattail	*Typha latifolia*	X	X	
Flannel Mullein	*Verbascum thapsus*	X	X	X
Dakota Vervain	*Verbena bipinnatifida*	X	X	X
Prostrate Vervain	*Verbena bracteata*		X	
Golden Crownbeard	*Verbisina encelioides*		X	
American Vetch	*Vicia americana*	X	X	
Nuttall Violet	*Viola nuttalli*	X	X	X
Longs Grape	*Vitis longii*	X	X	
Sixweeks Fescue	*Vulpa octoflora*	X	X	X
Oregon Woodsia	*Woodsia oregana*	X	X	
Cocklebur	*Xanthium strumarium*	X	X	
Small Soapweed	*Yucca glauca*	X	X	X
Rocky Mountain Zinnia	*Zinnia grandiflora*	X	X	X

APPENDIX G

Sites Recorded by NMSU in Training Area 7.

Site No.	Site Type	Age	Quad	Elevation	Acres	Eligibility
5LA8011	Lithic Scatter	Prehistoric	Painted Canyon	5085	0.13	No
5LA8012	Lithic Scatter	Prehistoric	Painted Canyon	5080	0.32	No
5LA8013	Lithic Scatter	Late Prehistoric	Painted Canyon	5120	2.75	Yes
5LA8014	Lithic Scatter	Prehistoric	Painted Canyon	5140	0.1	No
5LA8015	Lithic Scatter	Prehistoric	Painted Canyon	5065	0.38	No
5LA8016	Lithic Scatter	Prehistoric	Painted Canyon	5065	0.4	No
5LA8017	Homestead	Historic	Painted Canyon	5060	0.8	No
5LA8018	Lithic Scatter	Prehistoric	Painted Canyon	5040	1.83	No
5LA8019	Lithic Scatter	Prehistoric	Painted Canyon	4960	0.34	No
5LA8020	Lithic Scatter	Archaic	Painted Canyon	5040	0.02	No
5LA8021	Lithic Scatter	Archaic	Painted Canyon	5070	0.7	No
5LA8022	Lithic Scatter	Late Prehistoric	Painted Canyon	5070	2.04	No
5LA8023	Lithic Scatter	Late Paleoindian/Early Archaic	Painted Canyon	5050	2.47	Yes
5LA8024	Lithic Scatter	Late Paleoindian	Painted Canyon	5065	0.43	Yes
5LA8025	Lithic Scatter	Prehistoric	Painted Canyon	5065	0.49	No
5LA8026	Lithic Scatter	Prehistoric	Painted Canyon	5070	0.27	No
5LA8027	Lithic Scatter	Prehistoric	Painted Canyon	5075	0.23	No
5LA8028	Rock Art	Archaic	Lambing Spring	5180	0.74	Yes
5LA8029	Lithic Scatter	Prehistoric	Painted Canyon	5130	0.12	No
5LA8030	Lithic Scatter	Late Prehistoric	Painted Canyon	5120	4.74	No
5LA8031	Lithic Scatter	Prehistoric	Painted Canyon	5120	0.59	No
5LA8032	Lithic Scatter	Prehistoric	Painted Canyon	5145	0.56	No
5LA8033	Lithic Scatter	Prehistoric	Rock Crossing	5060	0.01	No
5LA8034	Lithic Scatter	Prehistoric	Painted Canyon	5130	0.12	No
5LA8035	Lithic Scatter	Prehistoric	Painted Canyon	5140	2.04	No
5LA8036	Lithic Scatter	Prehistoric	Painted Canyon	5120	0.47	No
5LA8037	Lithic Scatter/Structure	Late Prehistoric	Painted Canyon	5145	5.54	Yes
5LA8038	Lithic Scatter	Prehistoric	Painted Canyon	5165	1.43	No
5LA8039	Lithic Scatter	Prehistoric	Lambing Spring	5160	3.33	No
5LA8040	Lithic Scatter	Archaic	Painted Canyon	5160	0.03	No
5LA8041	Lithic Scatter	Prehistoric	Painted Canyon	5120	0.07	No
5LA8042	Lithic Scatter	Prehistoric	Lambing Spring	5180	0.46	No
5LA8043	Lithic Scatter	Late Prehistoric/Archaic	Brown Sheep Camp	5545	4	No
5LA8044	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5465	0.01	No
5LA8045	Lithic Scatter	Prehistoric	Brown Sheep Camp	5550	4.15	No
5LA8046	Lithic Scatter	Prehistoric	Brown Sheep Camp	5540	0.42	No
5LA8047	Lithic Scatter	Prehistoric	Brown Sheep Camp	5502	2	No
5LA8048	Lithic Scatter	Prehistoric	Brown Sheep Camp	5475	0.43	No
5LA8049	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5520	0.12	No
5LA8050	Lithic Scatter	Archaic	Brown Sheep Camp	5535	1.25	No
5LA8051	Lithic Scatter/Trash Scatter	Prehistoric/Historic	Brown Sheep Camp	5320	0.47	No
5LA8052	Lithic Scatter/Hearth	Late Prehistoric/Archaic	Brown Sheep Camp	5300	1.95	No
5LA8053	Lithic Scatter	Prehistoric	Brown Sheep Camp	5310	1.63	No
5LA8054	Lithic Scatter	Prehistoric	Brown Sheep Camp	5300	0.52	No
5LA8055	Lithic Scatter	Prehistoric	Brown Sheep Camp	5310	0.71	No
5LA8056	Lithic Scatter	Prehistoric	Brown Sheep Camp	5320	0.14	No
5LA8057	Lithic Scatter	Archaic	Brown Sheep Camp	5246	3.73	No
5LA8058	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5260	2.87	No
5LA8059	Lithic Scatter	Prehistoric	Brown Sheep Camp	5200	1.14	No
5LA8060	Lithic Scatter	Prehistoric	Rock Crossing	5195	0.25	No
5LA8061	Lithic Scatter	Prehistoric	Rock Crossing	5190	2.12	No
5LA8062	Lithic Scatter/Thermal Feature	Archaic	Brown Sheep Camp	5190	11.16	Yes
5LA8063	Lithic Scatter	Prehistoric	Rock Crossing	5185	0.06	No
5LA8064	Trash Scatter	Historic	Rock Crossing	5205	0.06	No
5LA8065	Lithic Scatter	Prehistoric	Rock Crossing	5180	0.44	No
5LA8066	Lithic Scatter	Archaic	Rock Crossing	5205	2.57	No
5LA8067	Lithic Scatter	Prehistoric	Rock Crossing	5179	1.32	No
5LA8068	Lithic Scatter	Prehistoric	Rock Crossing	5180	0.12	No
5LA8069	Lithic Scatter	Prehistoric	Brown Sheep Camp	5205	0.04	No

Appendix G continued.

5LA8070	Lithic Scatter	Prehistoric	Brown Sheep Camp	5540	2.81	No
5LA8071	Lithic Scatter	Late Prehistoric/Archaic	Brown Sheep Camp	5580	22.7	Yes
5LA8072	Lithic Scatter	Prehistoric	Brown Sheep Camp	5560	0.09	No
5LA8073	Lithic Scatter	Prehistoric	Brown Sheep Camp	5520	0.09	No
5LA8074	Lithic Scatter	Late Prehistoric/Archaic	Rock Crossing	5115	1.23	No
5LA8075	Lithic Scatter	Prehistoric	Rock Crossing	5100	1.51	No
5LA8076	Lithic Scatter	Prehistoric	Rock Crossing	5110	2.64	No
5LA8077	Lithic Scatter	Prehistoric	Rock Crossing	5110	0.8	No
5LA8078	Lithic Scatter	Late Prehistoric	Rock Crossing	5110	0.01	No
5LA8079	Lithic Scatter	Prehistoric	Rock Crossing	5100	0.41	No
5LA8080	Lithic Scatter	Late Prehistoric	Rock Crossing	5100	0.31	No
5LA8081	Lithic Scatter	Archaic	Rock Crossing	5080	0.2	No
5LA8082	Lithic Scatter	Prehistoric	Rock Crossing	5080	0.16	No
5LA8083	Lithic Scatter	Prehistoric	Rock Crossing	5100	0.16	No
5LA8084	Lithic Scatter	Prehistoric	Rock Crossing	5120	0.03	No
5LA8085	Lithic Scatter	Prehistoric	Rock Crossing	5080	0.28	No
5LA8086	Lithic Scatter	Prehistoric	Rock Crossing	5075	0.04	No
5LA8087	Lithic Scatter	Prehistoric	Rock Crossing	5085	0.22	No
5LA8088	Lithic Scatter	Archaic/Late Prehistoric	Rock Crossing	5470	1.01	No
5LA8089	Lithic Scatter	Prehistoric	Brown Sheep Camp	5360	0.51	No
5LA8090	Structure/Lithic Scatter	Prehistoric	Brown Sheep Camp	5265	0.12	No
5LA8091	Lithic Scatter/Hearth	Late Prehistoric	Rock Crossing	5168	1	No
5LA8092	Lithic Scatter	Archaic	Rock Crossing	5165	0.9	Yes
5LA8093	Lithic Scatter	Prehistoric	Rock Crossing	5182	0.45	No
5LA8094	Lithic Scatter	Archaic	Brown Sheep Camp	5425	5.95	No
5LA8095	Lithic Scatter	Prehistoric	Brown Sheep Camp	5360	0.27	No
5LA8096	Structure/Trash Scatter	historic	Brown Sheep Camp	5325	0.08	No
5LA8097	Lithic Scatter	Prehistoric	Brown Sheep Camp	5305	0.24	No
5LA8098	Lithic Scatter	Prehistoric	Brown Sheep Camp	5335	0.23	No
5LA8099	Lithic Scatter	Archaic/Late Prehistoric	Brown Sheep Camp	5440	0.8	No
5LA8100	Lithic Scatter	Late Prehistoric/Archaic	Brown Sheep Camp	5350	0.03	No
5LA8101	Lithic Scatter	Prehistoric	Brown Sheep Camp	5340	0.8	No
5LA8102	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5470	0.61	No
5LA8103	Lithic Scatter	Prehistoric	Brown Sheep Camp	5400	1.16	No
5LA8104	Lithic Scatter/Structure	Late Prehistoric	Brown Sheep Camp	5520	4.8	Yes
5LA8105	Lithic Scatter	Prehistoric	Brown Sheep Camp	5480	0.05	No
5LA8106	Lithic Scatter	Prehistoric	Rock Crossing	5050	0.72	No
5LA8107	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5620	0.28	No
5LA8108	Lithic Scatter	Archaic	Brown Sheep Camp	5520	0.29	No
5LA8109	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5600	0.28	No
5LA8110	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5630	0.03	No
5LA8213	Lithic Scatter	Prehistoric	Brown Sheep Camp	5370	0.48	No
5LA8214	Lithic Scatter	Prehistoric	Brown Sheep Camp	5475	1.45	No
5LA8215	Lithic Scatter	Prehistoric	Brown Sheep Camp	5450	0.07	No
5LA8216	Lithic Scatter	Prehistoric	Rock Crossing	5050	1.7	No
5LA8217	Lithic Scatter/Structure/Trash	Late Prehistoric/Archaic/Historic	Brown Sheep Camp	5550	6.39	No
5LA8218	Lithic Scatter	Prehistoric	Brown Sheep Camp	5560	0.05	No
5LA8219	Lithic Scatter	Paleoindian/Late Prehistoric	Brown Sheep Camp	5520	0.66	No
5LA8220	Lithic Scatter	Archaic/Late Prehistoric	Brown Sheep Camp	5520	0.17	No
5LA8221	Lithic Scatter	Prehistoric	Brown Sheep Camp	5560	0.47	No
5LA8222	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5440	2.42	Yes
5LA8223	Lithic Scatter	Prehistoric	Brown Sheep Camp	5620	0.03	No
5LA8224	Lithic Scatter/Trash Scatter	Late Prehistoric/Historic	Brown Sheep Camp	5580	1.12	No
5LA8225	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5560	0.05	No
5LA8226	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5660	1.08	No
5LA8227	Lithic Scatter	Prehistoric	Brown Sheep Camp	5400	0.83	No
5LA8228	Lithic Scatter	Prehistoric	Brown Sheep Camp	5400	0.47	No
5LA8229	Lithic Scatter/Trash Scatter	Prehistoric/Historic	Brown Sheep Camp	5265	0.69	No
5LA8230	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5280	0.34	No
5LA8231	Lithic Scatter/Trash Scatter	Late Prehistoric/Archaic/Historic	Brown Sheep Camp	5310	14.85	No
5LA8232	Lithic Scatter	Prehistoric	Brown Sheep Camp	5320	1.4	No
5LA8233	lithic scatter	Prehistoric	Brown Sheep Camp	5420	0.05	No
5LA8234	Lithic Scatter	Prehistoric	Brown Sheep Camp	5470	0.22	No
5LA8235	Lithic Scatter	Prehistoric	Brown Sheep Camp	5525	2.28	No

Appendix G continued.

5LA8236	Lithic Scatter	Prehistoric	Brown Sheep Camp	5420	0.02	No
5LA8237	Lithic Scatter	Prehistoric	Brown Sheep Camp	5470	0.19	No
5LA8238	Lithic Scatter	Prehistoric	Brown Sheep Camp	5480	0.01	No
5LA8239	Lithic Scatter	Archaic/Late Prehistoric	Brown Sheep Camp	5580	0.55	No
5LA8240	Lithic Scatter	Prehistoric	Brown Sheep Camp	5710	0.5	No
5LA8241	Lithic Scatter	Archaic	Brown Sheep Camp	5695	0.31	No
5LA8242	Lithic Scatter	Prehistoric	Rock Crossing	5190	0.26	No
5LA8243	Lithic Scatter	Prehistoric	Brown Sheep Camp	5720	0.11	No
5LA8244	Lithic Scatter	Prehistoric	Brown Sheep Camp	5610	1.01	No
5LA8245	Lithic Scatter	Prehistoric	Brown Sheep Camp	5600	0.41	No
5LA8246	Lithic Scatter	Prehistoric	Brown Sheep Camp	5575	0.04	No
5LA8247	Lithic Scatter	Prehistoric	Brown Sheep Camp	5610	0.15	No
5LA8248	Lithic Scatter	Prehistoric	Brown Sheep Camp	5610	0.17	No
5LA8249	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5600	0.16	No
5LA8250	Lithic Scatter/Structure	Prehistoric/Historic	Brown Sheep Camp	5620	0.74	No
5LA8251	Lithic Scatter/Trash Scatter	Prehistoric/Historic	Brown Sheep Camp	5620	1.67	No
5LA8252	Lithic Scatter	Prehistoric	Brown Sheep Camp	5525	0.005	No
5LA8253	Lithic Scatter	Prehistoric	Brown Sheep Camp	5310	0.09	No
5LA8254	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5320	0.1	No
5LA8255	Lithic Scatter	Archaic/Late Prehistoric	Brown Sheep Camp	5320	0.19	No
5LA8256	Lithic Scatter	Archaic	Brown Sheep Camp	5340	2.02	No
5LA8257	Lithic Scatter	Prehistoric	Brown Sheep Camp	5290	0.03	No
5LA8258	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5330	0.08	No
5LA8259	Lithic Scatter	Late Prehistoric/Archaic	Brown Sheep Camp	5330	0.58	No
5LA8260	Lithic Scatter	Prehistoric	Brown Sheep Camp	5340	0.43	No
5LA8261	Lithic Scatter	Late Prehistoric	Brown Sheep Camp	5340	0.87	No
5LA8262	Lithic Scatter	Prehistoric	Brown Sheep Camp	5580	0.39	No
5LA8263	Lithic Scatter	Prehistoric	Brown Sheep Camp	5605	0.02	No
5LA8264	Lithic Scatter	Archaic	Thatcher	5540	0.01	No
5LA8265	Lithic Scatter	Prehistoric	Thatcher	5580	0.02	No
5LA8266	Lithic Scatter	Late Prehistoric	Thatcher	5540	0.23	No
5LA8267	Lithic Scatter	Prehistoric	Thatcher	5545	0.12	No
5LA8268	Lithic Scatter	Prehistoric	Thatcher	5455	0.02	No
5LA8269	Lithic Scatter	Prehistoric	Thatcher	5569	0.22	No
5LA8270	Lithic Scatter	Prehistoric	Thatcher	5585	0.25	No
5LA8271	Lithic Scatter	Prehistoric	Thatcher	5585	0.7	No
5LA8272	Lithic Scatter	Prehistoric	Brown Sheep Camp	5600	0.23	No
5LA8273	Lithic Scatter	Prehistoric	Brown Sheep Camp	5600	0.75	No
5LA8274	Lithic Scatter	Prehistoric	Thatcher	5565	10.5	No
5LA8275	Lithic Scatter	Prehistoric	Brown Sheep/Thatcher	5565	0.6	No
5LA8276	Lithic Scatter	Prehistoric	Brown Sheep Camp	5355	0.19	No
5LA8277	Lithic Scatter	Archaic	Thatcher	5540	3.67	No
5LA8278	Lithic Scatter	Prehistoric	Thatcher	5545	0.53	No
5LA8279	Lithic Scatter	Late Prehistoric/Archaic	Rock Crossing	5320	1.16	No
5LA8280	Lithic Scatter/Structure	Archaic/Historic	Brown Sheep Camp	5340	5.2	No
5LA8281	Lithic Scatter/Trash Scatter	Prehistoric/Historic	Brown Sheep Camp	5740	0.03	No
5LA8282	Lithic Scatter/Trash Scatter	Prehistoric/Historic	Brown Sheep Camp	5661	4.1	No

APPENDIX H

Revisited Site Numbers and Isolated Finds Recorded by NMSU in Training Area 7.

Site	Eligibility	Class	Comments
5LA2250	Not Eligible	Revisited Site	No artifact analysis or collection
5LA2352	Not Eligible	Revisited Site	No artifact analysis or collection
5LA2353	Not Eligible	Revisited Site	No artifact analysis or collection
5LA2446	Not Eligible	Revisited Site	No artifact analysis or collection
5LA2447	Not Eligible	Revisited Site	No artifact analysis or collection
5LA2462	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3035	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3043	Eligible	Revisited Site	No artifact analysis or collection
5LA3183	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3185	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3214	Eligible	Revisited Site	One point collected
5LA3221	Eligible	Revisited Site	No artifact analysis or collection
5LA3226	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3235	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3252	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3411	Eligible	Revisited Site	No artifact analysis or collection
5LA3412	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3413	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3458	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3519	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3539	Eligible	Revisited Site	Scraper and point collected
5LA3544	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3545	Eligible	Revisited Site	No artifact analysis or collection
5LA3554	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3557	Not Eligible	Revisited Site	No artifact analysis or collection
5LA3584	Eligible	Revisited Site	No artifact analysis or collection
5LA3619	Eligible	Revisited Site	No artifact analysis or collection
5LA4027	Not Eligible	Revisited Site	No artifact analysis or collection
5LA4037	Not Eligible	Revisited Site	No artifact analysis or collection
5LA4053	Not Eligible	Revisited Site	No artifact analysis or collection
5LA4086	Not Eligible	Revisited Site	No artifact analysis or collection
5LA4438	Not Eligible	Revisited Site	No artifact analysis or collection
5LA5040	Not Eligible	Revisited Site	No artifact analysis or collection
5LA5256	Eligible	Revisited Site	Debitage sampled, all tools recorded
5LA5269	Eligible	Revisited Site	Debitage and all tools recorded
5LA5414	Not Eligible	Revisited Site	No artifact analysis or collection
5LA5503	Eligible	Revisited Site	No artifact analysis or collection
5LA5619	Not Eligible	Revisited Site	No artifact analysis or collection
5LA5676	Eligible	Revisited Site	No artifact analysis or collection
5LA8112	Not Eligible	Isolated Find	Historic Artifact
5LA8113	Not Eligible	Isolated Find	Two pieces of debitage
5LA8114	Not Eligible	Isolated Find	One piece of debitage
5LA8115	Not Eligible	Isolated Find	Three pieces of debitage
5LA8116	Not Eligible	Isolated Find	One piece of debitage
5LA8117	Not Eligible	Isolated Find	Two pieces of debitage
5LA8118	Not Eligible	Isolated Find	One piece of ground stone

Appendix H continued.

5LA8119	Not Eligible	Isolated Find	Four pieces of debitage
5LA8120	Not Eligible	Isolated Find	One piece of debitage
5LA8121	Not Eligible	Isolated Find	Two pieces of debitage
5LA8122	Not Eligible	Isolated Find	One piece of debitage
5LA8123	Not Eligible	Isolated Find	Four pieces of debitage
5LA8124	Not Eligible	Isolated Find	Two pieces of debitage
5LA8125	Not Eligible	Isolated Find	Three pieces of debitage
5LA8126	Not Eligible	Isolated Find	Four pieces of debitage
5LA8127	Not Eligible	Isolated Find	Three pieces of debitage
5LA8128	Not Eligible	Isolated Find	One piece of debitage
5LA8129	Not Eligible	Isolated Find	One piece of debitage
5LA8130	Not Eligible	Isolated Find	Two pieces of debitage
5LA8131	Not Eligible	Isolated Find	Four pieces of debitage
5LA8132	Not Eligible	Isolated Find	One piece of debitage
5LA8133	Not Eligible	Isolated Find	One point collected
5LA8134	Not Eligible	Isolated Find	Two pieces of debitage
5LA8135	Not Eligible	Isolated Find	Four pieces of debitage
5LA8136	Not Eligible	Isolated Find	Two pieces of debitage
5LA8137	Not Eligible	Isolated Find	Three pieces of debitage
5LA8138	Not Eligible	Isolated Find	One piece of debitage
5LA8139	Not Eligible	Isolated Find	Four pieces of debitage
5LA8140	Not Eligible	Isolated Find	One point collected
5LA8141	Not Eligible	Isolated Find	One piece of debitage
5LA8142	Not Eligible	Isolated Find	One point collected
5LA8143	Not Eligible	Isolated Find	Two pieces of debitage
5LA8144	Not Eligible	Isolated Find	One piece of debitage
5LA8145	Not Eligible	Isolated Find	Four pieces of debitage
5LA8146	Not Eligible	Isolated Find	One piece of debitage
5LA8147	Not Eligible	Isolated Find	One piece of debitage
5LA8148	Not Eligible	Isolated Find	One piece of debitage
5LA8149	Not Eligible	Isolated Find	One point collected
5LA8150	Not Eligible	Isolated Find	One point collected
5LA8151	Not Eligible	Isolated Find	Two pieces of debitage
5LA8152	Not Eligible	Isolated Find	One piece of debitage
5LA8153	Not Eligible	Isolated Find	Two pieces of debitage
5LA8154	Not Eligible	Isolated Find	One piece of debitage
5LA8155	Not Eligible	Isolated Find	Two pieces of debitage
5LA8156	Not Eligible	Isolated Find	Two pieces of debitage
5LA8157	Not Eligible	Isolated Find	Three pieces of debitage
5LA8158	Not Eligible	Isolated Find	One piece of debitage
5LA8159	Not Eligible	Isolated Find	Two pieces of debitage
5LA8160	Not Eligible	Isolated Find	One utilized flake collected
5LA8161	Not Eligible	Isolated Find	One piece of debitage
5LA8162	Not Eligible	Isolated Find	One piece of debitage
5LA8163	Not Eligible	Isolated Find	Two pieces of debitage
5LA8164	Not Eligible	Isolated Find	One piece of debitage
5LA8165	Not Eligible	Isolated Find	One piece of debitage
5LA8166	Not Eligible	Isolated Find	One piece of debitage
5LA8167	Not Eligible	Isolated Find	Two pieces of debitage
5LA8168	Not Eligible	Isolated Find	Four pieces of debitage
5LA8169	Not Eligible	Isolated Find	Three pieces of debitage

Appendix H continued.

5LA8170	Not Eligible	Isolated Find	One piece of debitage
5LA8171	Not Eligible	Isolated Find	One piece of debitage
5LA8172	Not Eligible	Isolated Find	One piece of debitage
5LA8173	Not Eligible	Isolated Find	One piece of debitage
5LA8174	Not Eligible	Isolated Find	Two pieces of debitage
5LA8175	Not Eligible	Isolated Find	One point collected
5LA8176	Not Eligible	Isolated Find	Four pieces of debitage
5LA8177	Not Eligible	Isolated Find	Four pieces of debitage
5LA8178	Not Eligible	Isolated Find	One piece of ground stone
5LA8179	Not Eligible	Isolated Find	One piece of ground stone
5LA8180	Not Eligible	Isolated Find	One piece of debitage
5LA8192	Not Eligible	Isolated Find	One piece of debitage
5LA8193	Not Eligible	Isolated Find	Two pieces of debitage
5LA8194	Not Eligible	Isolated Find	One piece of ground stone
5LA8195	Not Eligible	Isolated Find	One piece of debitage
5LA8196	Not Eligible	Isolated Find	Three pieces of debitage
5LA8197	Not Eligible	Isolated Find	Two pieces of debitage
5LA8198	Not Eligible	Isolated Find	One piece of debitage
5LA8199	Not Eligible	Isolated Find	Three pieces of debitage
5LA8200	Not Eligible	Isolated Find	Three pieces of debitage
5LA8201	Not Eligible	Isolated Find	One core-tool
5LA8202	Not Eligible	Isolated Find	One piece of debitage
5LA8203	Not Eligible	Isolated Find	One piece of debitage
5LA8204	Not Eligible	Isolated Find	Three pieces of debitage
5LA8205	Not Eligible	Isolated Find	Two pieces of debitage
5LA8206	Not Eligible	Isolated Find	Two pieces of debitage
5LA8313	Not Eligible	Isolated Find	Two pieces of debitage
5LA8314	Not Eligible	Isolated Find	Four pieces of debitage
5LA8315	Not Eligible	Isolated Find	One piece of debitage
5LA8316	Not Eligible	Isolated Find	One piece of debitage
5LA8317	Not Eligible	Isolated Find	One point collected
5LA8318	Not Eligible	Isolated Find	One piece of debitage
5LA8319	Not Eligible	Isolated Find	One piece of debitage
5LA8320	Not Eligible	Isolated Find	Historic Item
5LA8321	Not Eligible	Isolated Find	One piece of debitage
5LA8322	Not Eligible	Isolated Find	Four pieces of debitage
5LA8322	Not Eligible	Isolated Find	Four pieces of debitage
5LA8323	Not Eligible	Isolated Find	Three pieces of debitage
5LA8324	Not Eligible	Isolated Find	One piece of debitage
5LA8325	Not Eligible	Isolated Find	Three pieces of debitage
5LA8326	Not Eligible	Isolated Find	One biface collected
5LA8327	Not Eligible	Isolated Find	One piece of debitage
5LA8328	Not Eligible	Isolated Find	One piece of ground stone
5LA8329	Not Eligible	Isolated Find	One piece of debitage
5LA8341	Not Eligible	Isolated Find	One point collected
5LA8342	Not Eligible	Isolated Find	Two pieces of debitage
5LA8343	Not Eligible	Isolated Find	One piece of ground stone
5LA8344	Not Eligible	Isolated Find	One edge-ground cobble
5LA8345	Not Eligible	Isolated Find	One piece of debitage
5LA8346	Not Eligible	Isolated Find	One end/side scraper collected
5LA8347	Not Eligible	Isolated Find	One piece of ground stone

Appendix H continued.

5LA8348	Not Eligible	Isolated Find	One piece of debitage
5LA8349	Not Eligible	Isolated Find	One piece of debitage
5LA8350	Not Eligible	Isolated Find	One edge-ground cobble
5LA8351	Not Eligible	Isolated Find	One side scraper collected
5LA8352	Not Eligible	Isolated Find	One piece of ground stone
5LA8356	Not Eligible	Isolated Find	One piece of ground stone
5LA8623	Not Eligible	Isolated Find	One biface collected
5LA8624	Not Eligible	Isolated Find	Two pieces of debitage
5LA8625	Not Eligible	Isolated Find	One piece of ground stone
5LA8626	Not Eligible	Isolated Find	One piece of ground stone
5LA8627	Not Eligible	Isolated Find	One piece of ground stone
5LA8633	Not Eligible	Isolated Find	One biface collected

APPENDIX I

Piñon Canyon Maneuver Site – Training Area 7
Ceramic Analysis
April 9, 2001

Lori S. Reed
Animas Ceramic Consulting, Inc.
1909 E. 20th Street, Suite 4
Farmington, NM 87401
(505) 327-3998

INTRODUCTION

An assemblage of 18 sherds from five sites on the Piñon Canyon Maneuver Site (PCMS) was submitted for analysis. Because the assemblage was small, all sherds were analyzed regardless of size. Table 1 provides a list of the ceramic types and counts from each site. The majority of the sherds were classified as Cord-marked utility, in addition to one Polished utility, one indeterminate utility, and a single piece of fire-hardened adobe.

Table 1. Ceramic Type Frequencies from PCMS Sites.

Site	Polished utility	Cord-marked utility	Indet. utility	Fired adobe	Total
5LA5256	1	-	-	-	1
5LA8104	-	7	-	-	7
5LA8221	-	-	-	1	1
5LA8222	-	8	-	-	8
5LA8266	-	-	1	-	1
Total	1	15	1	1	18

METHODS

Following Straziciche (2000) and Hummer (1989), the ceramic artifacts were classified into ware categories, including Cord-marked, Polished, and Plain wares. Although Hummer (1989) identifies Painted and Micaceous wares for PCMS pottery, none of the artifacts submitted for analysis fell within these categories.

Interior and exterior surface textures were classified as either cord-marked, smoothed, polished, or plain. Polished surfaces exhibited distinctive striations produced by rubbing the vessel surface with a hard tool while the clay was leather hard. Smoothed surfaces, on the other hand, lacked a polished luster but were tactually smooth. Plain surfaces were rough, with temper particles protruding through the surface. Cord-marked surfaces were characterized by distinctive cord impressions applied to the vessel while it was in a near leather hard state.

Three attributes, use wear, appendages, and postfiring modifications, indicative of vessel or sherd function also were recorded. The term "use wear" encompasses attrition patterns indicative of functional wear on a ceramic vessel. Types of use wear include sooting, basal abrasion, and rim chipping, among others (see Skibo 1993). Appendages are handles or other types of attachments added to a vessel, often reflecting functional attributes. For example, a jar form with a single handle appended near the rim may have been used as a pitcher. Finally, postfiring modifications are generally identified on sherd fragments resulting from reuse of sherds for tools. Examples of postfiring modifications include pendants, scrapers, and ground sherd edges; drill holes for repair or suspension of a pot are classified as postfiring modifications as well.

Paste characteristics recorded include original paste color, refired paste color, and temper in the original paste and refired paste. Paste colors were identified using the Munsell Soil Color Charts (1994). Tempering material was identified using a Meiji binocular microscope with a fiber optic ring light source. Temper grains were classified by general mineralogical type, such

as quartz sand, unidentified rock fragments, and hematite. Grain sizes were assigned using a template showing very coarse (1.0-2.0 mm), coarse (0.5-1.0 mm), medium (0.25-0.5 mm), and fine (0.125-0.25 mm). At 20x to 40x magnification, very fine and silt-sized grains were not classified, but were assumed to be natural inclusions in the clay. Petrographic analysis of sherds from the PCMS assemblages would provide a more detailed mineralogical and grain size classification for the temper. Refired ceramic pastes were produced by taking a small fragment from a sherd and oxidizing the fragment in a Paradox electric kiln with computerized control settings. All samples were refired at 950° C for 30 minutes. Based on principles of clay mineralogy, iron content in clays, and the reaction of clays to high temperatures in an oxidizing atmosphere (see Shepard 1954), the distributions of refired paste colors reflect clay resource selection. By oxidizing sherds in a controlled setting, homogenized colors classified as buff, yellowish red, or red may be compared to discuss clay selection in general terms. Also, oxidation of ceramic pastes provides a clearer, homogenous color through which tempering material is more easily recognized.

SITE: 5LA5256

A single polished utility ware sherd was analyzed from 5LA5256. Tempering material was identified as medium quartz sand with rounded to sub-rounded grains. The sherd is from the neck portion of a jar having a highly polished exterior surface and a lighter polished interior surface. It lacked any evidence of use wear, appendages, or postfiring modifications. The paste color is dark gray to black with a Munsell designation of 2.5N. Oxidation of a fragment in an electric kiln fired out the carbonized material producing a red paste with a 2.5YR 5/8 Munsell color.

SITE: 5LA8104

Seven sherds were analyzed from 5LA8104, including 4 body, 2 handle, and 1 neck fragments from a single jar (Vessel 1). Compared to the other site assemblages, the sherds from 5LA8104 appear to be cord-roughened rather than cord-marked. This distinction is based on the random cord indentations present on this vessel, contrasting to the linear, patterned cord marks of sherds from 5LA8222. Interior surfaces of the 5LA8104 sherds are smoothed to an even, plain texture. As shown in Figure 4.43, the single coil handle fragments are smoothed to a plain texture rather than having a cord-roughened texture. It is unclear whether the large handle fragment and the smaller handle stub belong to a single handle or represent two handles. If they represent a single handle, then the vessel may have been used as a pitcher. Paste colors vary from 2.5N to 3N indicating that the jar was not fired high enough during the original firing to remove the dark organic inclusions in the paste. Upon oxidizing several samples, however, the refired color was 5YR 5/8, indicating that the clay source used was a red-firing clay. Re-examination of temper in the refired fragments support the original classification of medium quartz sand.

SITE: 5LA8221

A single artifact was submitted for analysis from 5LA8221. Although the fragment is of clay, it is not from a ceramic vessel. Rather, the clay fragment appears to be a piece of highly fired adobe having a vegetal impressed interior surface and a smoothed exterior surface. The

fragment is untempered, but has fine to silt-sized grains of quartz that were probably natural inclusion in the clay. Based on the presence of fused quartz grains that have almost vitrified into glass, the fragment must have burned or been purposefully fired at a very high temperature. Oxidation of a small fragment in an electric kiln failed to alter the original paste color of 10YR 7/4, further indicating that the adobe had been burned or purposefully fired to a temperature of 900° C or higher. Given the vegetal impressions on one side and hand-smoothed texture of the other side, I would venture to speculate that the adobe fragment is from a wall or cist that was carefully plastered or lined with clay and then smoothed with a wet hand. Compared to refired sherds from the other sites, the clay used to make the adobe was from a different clay source that fired to a buff color rather than the red-firing clays used to make pottery vessels.

SITE: 5LA8222

Eight cord-marked sherds associated with the Woodland period occupation of eastern Colorado were analyzed from 5LA8222. All of the sherds appear to have originated from a single vessel.

Vessel 1 is the remains of a cord-marked jar represented by six body and two base sherds, weighing 30.6 g. Cord marks on the exterior surface of the body fragments measure between 1.8 and 2.2 mm wide with a spacing of 1.5 mm. Because the vessel was probably placed on its base during and after the cord marks were applied, the exterior base has greater flattening and obliteration of the marks, with a cord width of 1.9 mm and a spacing of 2.7 mm. Three of the body sherds have overlapping cord marks forming a distinctive weaved pattern (Figure 4.49). Because the cord marks are relatively shallow, the cord texturing was probably applied to a relatively dryish clay not quite to a leather hard state. The interior surfaces of the sherds are scraped or wiped plain with an indeterminate tool applied to a relatively wet clay. Surface and paste color for all of the Vessel 1 body sherds were the same, with a Munsell designation of 7.5YR 7/6 for the paste and 5YR 6/4 for the exterior surface. The base sherds, on the other hand, are darker, with a paste color of 3N. The difference in color from body to paste may be an indication that the jar was used for cooking, with the base portion placed directly in the fire. Oxidation of the two sherd fragments from Vessel 1 produced refired colors of 5YR 5/8, but examination of the refired paste with the binocular microscope indicated that the temper may actually be some type of tuff and fine sand. In this case, petrographic analysis of the tempering material would provide conclusive characterization of the mineral grains. Based on analysis conducted by Straziciche (2000) for other PCMS assemblages, the tuff and sand temper identified for 5LA8222 appears similar to the volcanic ash and biotite temper recognized at 5LA7509, 5LA7438, and 5LA6878.

SITE: 5LA8266

A single sherd was submitted for analysis from 5LA8266. Because the fragment was small, weighing only 0.8 g, minimal information was obtained and interpretations of form and surface treatment are tentative. Tempering material was identified as medium quartz sand with sub-rounded to rounded grains. Original paste color was classified as 2.5N, but upon refiring of a small fragment the paste oxidized to 5YR 5/8 and the temper in the refired fragment was again identified as medium quartz sand. Based on refired paste color and temper, this sherd is most

similar to the ceramics from 5LA8104. Although the surface area of the sherd was small, interior and exterior surfaces appear to be plain, produced by either wiping or scraping with an indeterminate tool. Finally, the fragment was tentatively identified as a jar rim, and the rim lip was extremely small and eroded.

SUMMARY

Although the PCMS assemblage described here is small, it offered substantial data to evaluate the local ceramic tradition, and clay and temper resource use. Compared with the ceramic data for other PCMS sites presented by Straziciche (2000), the ceramics from 5LA5256, 5LA8104, 5LA8222, and 5LA8266 probably represent expedient local manufacture. Also, the low mineral inclusions and friable paste textures described by Straziciche (2000) certainly apply to the assemblages described above, suggesting that clays were collected and used with little modification (e.g., levigation) and that vessels were fired at low temperatures. The dark ceramic pastes further support low-fired pottery technology, producing pastes for which organic inclusions were not burned away during the original firing.

As mentioned by Straziciche (2000), petrographic analysis of ceramics, raw tempers, and clay deposits would be useful to identify mineralogical variability in local raw materials and to interpret local resource use by prehistoric potters. Inductively coupled plasma spectroscopy (ICP) or Neutron Activation Analysis (NAA) studies also would be worthwhile in matching ceramics with raw material sources. These types of studies have been used extensively in the Southwest to address research issues of local resource use, pottery production technology, and changes in pottery technology temporally and geographically (see Hensler 1999; James et al. 1995; Reed et al. 1998; Reed et al. 2001; Stoltman et al. 1992; Zedeño et al. 1993).

The oxidation data presented for each of the PCMS assemblages, however, does offer some general information regarding clay resource selection. All of the ceramic pastes sampled in the oxidation study refired to red colors, indicating that this particular group of potters were exploiting red-firing clays probably from alluvial deposits containing abundant iron or other mineral inclusions. In contrast, the adobe sample from 5LA8221 refired to buff, suggesting that buff-firing clays are available locally, but potters may not have been exploiting these sources for ceramic production.

REFERENCES CITED

Hensler, Kathy Niles

1999 Anasazi Ceramic Traditions: A View from the Cove. In *Anasazi Community Development in Cove and Redrock Valley: Archaeological Excavations Along the N33 Road in Apache County, Arizona,* edited by P. F. Reed and K. N. Hensler, pp. 551-686. Navajo Nation Papers in Anthropology No. 33. Navajo Nation Archaeology Department, Window Rock, Arizona.

Hummer, Anne G.

1989 Prehistoric Ceramics. In *Temporal Assessment of Diagnostic Materials from the Pinon Canyon Maneuver Site: Towards the Development of a Cultural Chronology for Southeastern Colorado*, edited by C. Lintz and J. L. Anderson, pp. 316-374. Memoirs of the Colorado Archaeological Society Number 4. Colorado Archaeological Society.

James, W. D., R. L. Brewington, and H. J. Shafer

1995 Compositional Analysis of American Southwestern Ceramics by Neutron Activation Analysis. *Journal of Radioanalytical and Nuclear Chemistry*, Articles, Vol. 192(1): 109-116.

Munsell Color

1994 Munsell Soil Color Charts. Revised edition. Macbeth Division of Kollmorgen Instruments Corporation, New Windsor, New York.

Reed, Lori Stephens, Joell Goff, and Kathy Niles Hensler

1998 *Exploring Ceramic Production, Distribution, and Exchange in the Southern Chuska Valley: Analytical Results from the El Paso Natural Gas North System Expansion Project.* Pipeline Archaeology 1990-1993: The El Paso Natural Gas North System Expansion Project, New Mexico and Arizona, edited by T. M. Kearns, Volume XI. Western Cultural Resource Management, Inc., Farmington, New Mexico.

Reed, Lori Stephens, Kathy Niles Hensler, and Andrea Carpenter

2001 Tracking the Trachyte: Origins and Development of Chuska Pottery Technology. Paper presented at the 66th Annual Meeting of the Society for American Archaeology, New Orleans, Louisiana.

Shepard, Anna O.

1954 *Ceramics for the Archaeologist.* Publication 609, 1980 reprint. Carnegie Institution of Washington, D.C.

Skibo, James M.

1993 *Pottery Function: A Use-Alteration Perspective.* Plenum Press, New York.

Stoltman, James B., James H. Burton, and Jonathan Haas
1992 Chemical and Petrographic Characterizations of Ceramic Pastes: Two Perspectives on a Single Data Set. In *Chemical Characterization of Ceramic Pastes in Archaeology*, edited by H. Neff, pp. 85-92. Monographs in World Archaeology No. 7. Prehistory Press, Madison, Wisconsin.

Straziciche, Nicola
2000 Ceramic Analysis. In *Archaeological Sites Inventory in the* Black Hills of the Piñon Canyon Maneuver Site, Las Animas County, Colorado, by Mark Owens, Christopher R. Loendorf, Vincent Schiavitti, and Lawrence L. Loendorf, pp. 401-421. Report submitted to the Midwest Archeological Center, National Park Service, Lincoln, Nebraska.

Zedeño, Maria Nieves, James Busman, James Burton, and Barbara J. Mills
1993 Ceramic Compositional Analyses. In *Interpretation of Ceramic Artifacts*, by B. J. Mills, C. E. Goetze, and M. N. Zedeño, pp. 187-277. Across the Colorado Plateau: Anthropological Studies for the Transwestern Pipeline Expansion Project, Volume XVI. Office of Contract Archaeology and Maxwell Museum of Anthropology, University of New Mexico, Albuquerque.

APPENDIX J

Site Eligibility and Management Recommendations for Sites in Training Area 7.

Site No.	Eligibility	Criteria	Recommendation
5LA8011	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8012	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8013	Eligible	Criterion D	Avoid
5LA8014	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8015	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8016	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8017	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8018	Not Eligible	There is a lack of integrity due to military impact	No Further Work
5LA8019	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8020	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8021	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8022	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8023	Eligible	Criterion D	Avoid and Test
5LA8024	Eligible	Criterion D	Avoid and Test
5LA8025	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8026	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8027	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8028	Eligible	Criteria D and C, Criteria Consideration A (religious/mythological function)	Fence and Avoid
5LA8029	Not Eligible	Sparse surface evidence	No Further Work
5LA8030	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8031	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8032	Not Eligible	Sparse surface evidence and no little for buried deposits	No Further Work
5LA8033	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8034	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8035	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8036	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8037	Eligible	Criterion D	Fence and Avoid
5LA8038	Not Eligible	Sparse surface evidence	No Further Work
5LA8039	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8040	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8041	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8042	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8043	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8044	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8045	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8046	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8047	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8048	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8049	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8050	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8051	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8052	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8053	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8054	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8055	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8056	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8057	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8058	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8059	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8060	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8061	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8062	Eligible	Criterion D	Fence and Avoid
5LA8063	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8064	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8065	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8066	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work

Appendix J continued.

5LA8067	Not Eligible	There is a lack of integrity due to military impact and erosion	No Further Work
5LA8068	Not Eligible	Sparse surface evidence	No Further Work
5LA8069	Not Eligible	Sparse surface evidence	No Further Work
5LA8070	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8071	Eligible	Criterion D	Sign and Avoid
5LA8072	Not Eligible	Sparse surface evidence	No Further Work
5LA8073	Not Eligible	Sparse surface evidence	No Further Work
5LA8074	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8075	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8076	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8077	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8078	Not Eligible	Sparse surface evidence	No Further Work
5LA8079	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8080	Not Eligible	Sparse surface evidence	No Further Work
5LA8081	Not Eligible	Sparse surface evidence	No Further Work
5LA8082	Not Eligible	Sparse surface evidence	No Further Work
5LA8083	Not Eligible	Sparse surface evidence and lack of integrity due to military impact	No Further Work
5LA8084	Not Eligible	Sparse surface evidence	No Further Work
5LA8085	Not Eligible	Sparse surface evidence	No Further Work
5LA8086	Not Eligible	Sparse surface evidence	No Further Work
5LA8087	Not Eligible	Sparse surface evidence	No Further Work
5LA8088	Not Eligible	No potential for buried deposits	No Further Work
5LA8089	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8090	Eligible	Criterion D (relationship of the property to its setting)	Data Recovery
5LA8091	Eligible	Criterion D	Data Recovery
5LA8092	Eligible	Criterion D	Avoid and Test
5LA8093	Not Eligible	Sparse surface evidence	No Further Work
5LA8094	Not Eligible	No potential for buried deposits	No Further Work
5LA8095	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8096	Not Eligible	There is a lack of structural integrity	No Further Work
5LA8097	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8098	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8099	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8100	Not Eligible	Sparse surface evidence	No Further Work
5LA8101	Not Eligible	Sparse surface evidence	No Further Work
5LA8102	Not Eligible	Sparse surface evidence	No Further Work
5LA8103	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8104	Eligible	Criterion D	Avoid and Test
5LA8105	Not Eligible	Sparse surface evidence and lack of integrity due to erosion	No Further Work
5LA8106	Not Eligible	Sparse surface evidence	No Further Work
5LA8107	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8108	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8109	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8110	Not Eligible	Sparse surface evidence	No Further Work
5LA8213	Not Eligible	Sparse surface evidence and lack of integrity due to erosion	No Further Work
5LA8214	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8215	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8216	Not Eligible	There is a lack of integrity due to erosion and animal burrowing	No Further Work
5LA8217	Not Eligible	No potential for buried deposits	No Further Work
5LA8218	Not Eligible	Sparse surface evidence	No Further Work
5LA8219	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8220	Not Eligible	Sparse surface evidence	No Further Work
5LA8221	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8222	Eligible	Criterion D	Avoid and Test
5LA8223	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8224	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8225	Not Eligible	Sparse surface evidence	No Further Work
5LA8226	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8227	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8228	Not Eligible	Sparse surface evidence	No Further Work
5LA8229	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8230	Not Eligible	Sparse surface evidence	No Further Work

Appendix J continued.

5LA8231	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8232	Not Eligible	Sparse surface evidence	No Further Work
5LA8233	Not Eligible	Sparse surface evidence	No Further Work
5LA8234	Not Eligible	Sparse surface evidence	No Further Work
5LA8235	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8236	Not Eligible	Sparse surface evidence	No Further Work
5LA8237	Not Eligible	Sparse surface evidence	No Further Work
5LA8238	Not Eligible	Sparse surface evidence	No Further Work
5LA8239	Not Eligible	Sparse surface evidence and lack of integrity due to severe erosion	No Further Work
5LA8240	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8241	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8242	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8243	Not Eligible	Sparse surface evidence and lack of integrity due to erosion	No Further Work
5LA8244	Not Eligible	Sparse surface evidence and lack of integrity due to erosion	No Further Work
5LA8245	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8246	Not Eligible	Sparse surface evidence	No Further Work
5LA8247	Not Eligible	Sparse surface evidence and lack of integrity due to erosion	No Further Work
5LA8248	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8249	Not Eligible	There is a lack of integrity due to erosion	No Further Work
5LA8250	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8251	Not Eligible	No potential for buried deposits	No Further Work
5LA8252	Not Eligible	Sparse surface evidence and lack of integrity due to erosion	No Further Work
5LA8253	Not Eligible	Sparse surface evidence and little potential for buried deposits	No Further Work
5LA8254	Not Eligible	Sparse surface evidence	No Further Work
5LA8255	Not Eligible	Sparse surface evidence and no potential for buried deposits	No Further Work
5LA8256	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8257	Not Eligible	Sparse surface evidence	No Further Work
5LA8258	Not Eligible	Sparse surface evidence and lack of integrity due to erosion and military impact	No Further Work
5LA8259	Not Eligible	Sparse surface evidence and lack of integrity due to erosion and military impact	No Further Work
5LA8260	Not Eligible	Sparse surface evidence	No Further Work
5LA8261	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8262	Not Eligible	Sparse surface evidence and little potential for buried deposits	No Further Work
5LA8263	Not Eligible	Sparse surface evidence	No Further Work
5LA8264	Not Eligible	Sparse surface evidence	No Further Work
5LA8265	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8266	Not Eligible	No potential for buried deposits	No Further Work
5LA8267	Not Eligible	Sparse surface evidence and lack of integrity due to military impact	No Further Work
5LA8268	Not Eligible	Sparse surface evidence	No Further Work
5LA8269	Not Eligible	Sparse surface evidence	No Further Work
5LA8270	Not Eligible	Sparse surface evidence and lack of integrity due to military impact	No Further Work
5LA8271	Not Eligible	No potential for buried deposits	No Further Work
5LA8272	Not Eligible	Sparse surface evidence and little potential for buried deposits	No Further Work
5LA8273	Not Eligible	Sparse surface evidence and little potential for buried deposits	No Further Work
5LA8274	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8275	Not Eligible	No potential for buried deposits	No Further Work
5LA8276	Not Eligible	Sparse surface evidence	No Further Work
5LA8277	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8278	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8279	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8280	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8281	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work
5LA8282	Not Eligible	There is no potential to contribute to our understanding of history or prehistory	No Further Work